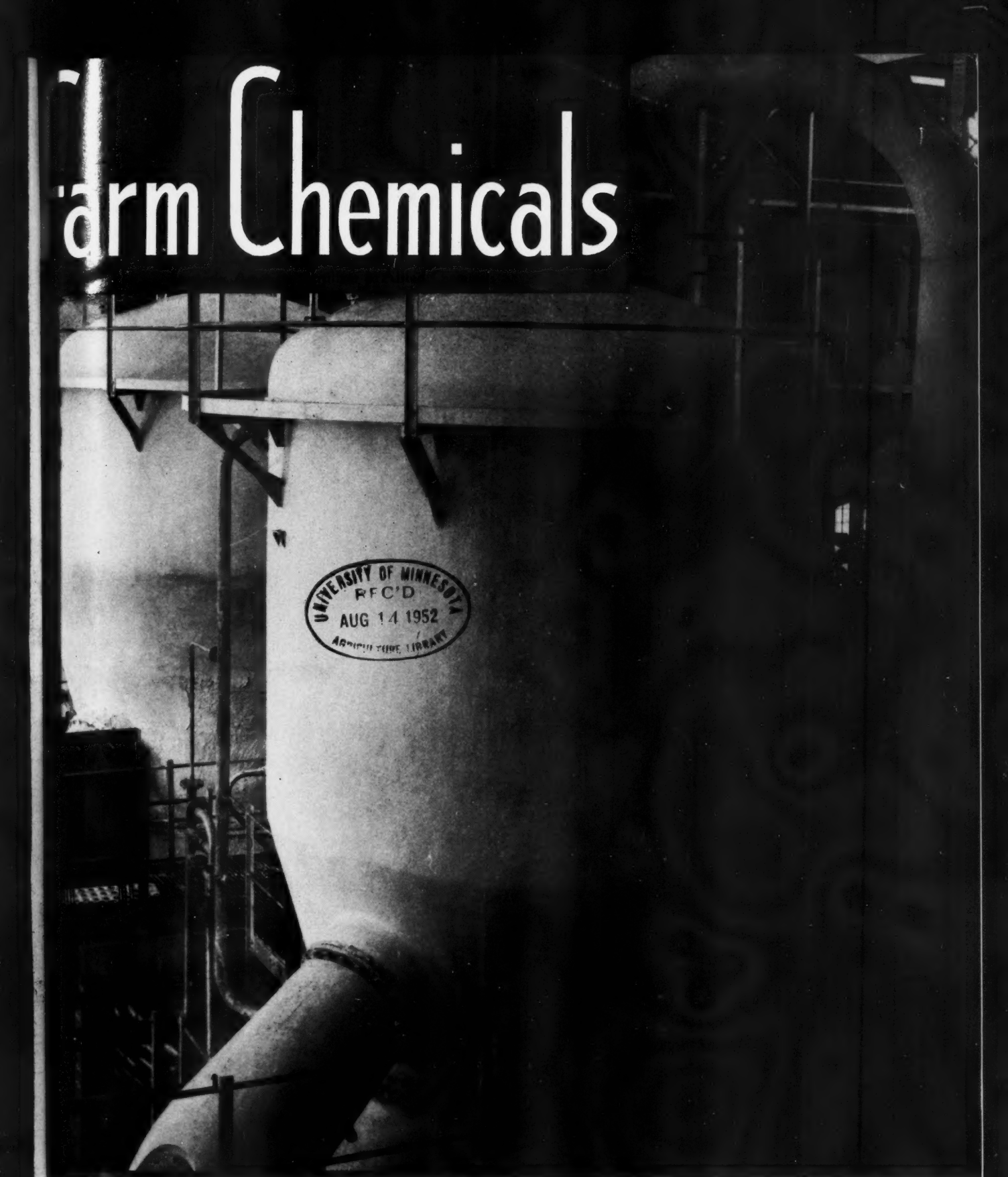

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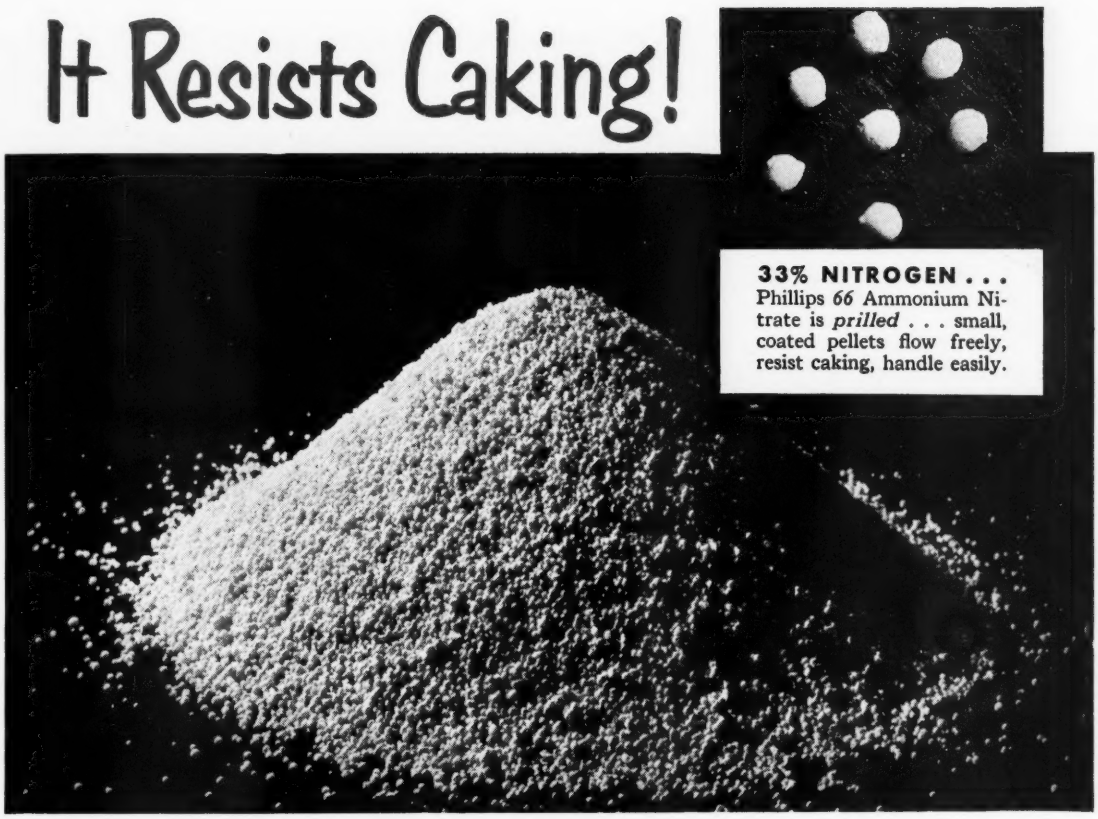

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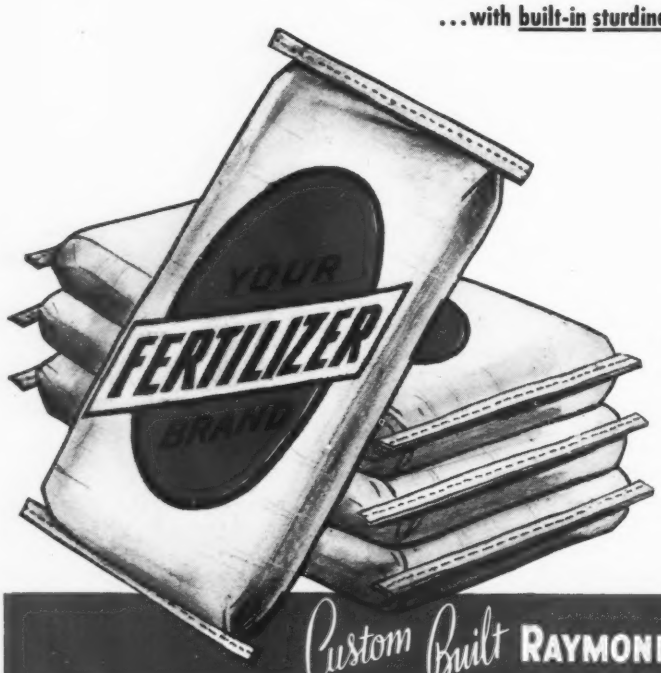

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In this issue . . .

EPN, the DuPont insecticide which was first introduced as a miticide for apples and other fruits, now is being recommended for control of mites and insects on deciduous fruits, citrus, corn, tomatoes, onions and beans. For the story of EPN 300, read the article on page 13. The product is listed in the official recommendations of 17 states. DuPont research scientists state tests have confirmed indications that EPN also has value on many other crops.

By now everybody knows that trace elements are necessary to guarantee healthy and productive crops. Years of research work have been devoted to the study of minor elements and their value to certain crops. For an interesting innovation in the field —a novel means of giving plants minor elements in handy form—read the story of Ferro Frit on page 17. Development and application of the Ferro corporation product is given in the article.

When one insect species is brought into control by a pesticide, the problem of insect control often isn't complete. For in killing one bug, others, formerly held in check by that insect, may run rampant. An interesting study of a combination of DDT with Dow Chemical's Ovotran Wettable to solve such a problem is outlined in the article on page 23.

"The future is practically unlimited." That's the way Paul T. Truitt views the outlook for the fertilizer industry. The importance of fertilizer production to a dynamic and expanding economy is the theme of a talk by Truitt, president of the American Plant Food Council, which appears on page 26. President Truitt also considers the outlook for the basic fertilizer elements—nitrogen, phosphorus and potash.

India still has plenty of troubles. Internal strife, political battles and famine have faced that country's people so long they are almost taken for granted. But real progress is being made to fight the last problem. With construction of the Sindri fertilizer plant—largest in the world—India took a big step toward spurring its agricultural output. See the picture story of the plant on page 30.

More legislation is asked by the Delaney committee in its final report to Congress. For a detailed account of the recommendations of the committee in its fourth report—covering "Food," read the feature on the last page of this issue. For comment on the report, see the editorial on page 7, which discusses the significance of the report on the farm chemicals industry.

farm chemicals

Formerly
American Fertilizer & Allied Chemicals

Established 1894

PIONEER JOURNAL OF THE FARM CHEMICALS INDUSTRY

Vol. 115 **AUGUST, 1952** **No. 8**

Contents

Cover Story

"Krystal" evaporators are an integral part of the complex Sindri fertilizer plant in India. Cover photo shows one used for ammonium sulfate. Picture story of the world's largest fertilizer plant is on page 30.

A magazine international in scope and circulation and devoted to manufacturers, mixers, and formulators of fertilizers and pesticides

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farm chemicals facts

. . . Briefly Noted

Export quotas on insecticides and fungicides containing 20 per cent or more sulfur have been raised by 37.5 million pounds for the second quarter by the Office of International Trade.

E. R. Squibb & Sons will merge with Mathieson Chemical corporation via an exchange of stock, if all goes well. Stockholders of both companies must approve. Mathieson plans to operate the drug firm as a division, using the Squibb name.

John M. Wallace of Kraft Bag has been given the additional sales territory of New Jersey, Pennsylvania, Delaware and Maryland. His office remains at 630 Fifth Avenue, New York.

St. Regis paper announces opening of a multiwall bag plant at Tacoma, Wash. It replaces a leased plant at Seattle. Occupying 81,600 square feet of floor space, the plant is adjacent to the kraft paper mill.

Dr. J. W. Fitts is new director of the Soil Testing division of North Carolina Department of Agriculture and professor of agronomy at State College. He formerly was on the faculty at Iowa State.

Died: C. E. LaFrage, 53 years associated with Virginia-Carolina Chemical and International Minerals and Chemical, at 79.

Kolker Chemical Works export sales activities have been transferred to the export sales of Diamond Alkali company in New York. S. B. Honour will continue as assistant of export sales.

A new Shell Oil sulfur plant at Jumping Pound, Alberta, Canada is producing 30 tons a day of 99.9 per cent pure sulfur. Source is hydrogen sulfide gas which comes with natural gas in the area.

DDT may help stop the northward advance of the pink bollworm, say USDA entomologists. At present, bollworms are confined to southern Texas, but each year their numbers increase.

Died: Joseph M. Coppinger, 60, general purchasing agent of International Minerals and Chemical corporation. Coppinger was taken ill at the Green Brier Hotel at White Sulphur Springs, W. Va., and died early the next morning.

Harold E. Clayton is new manager of the Davison Chemical corporation's Perry, Iowa plant. Formerly in charge of production at Columbus, O., Clayton succeeds **Russell M. Sloman** as manager. **Ralph E. Hope** now is manager of research engineering. Hope has been Davison's representative in England for the last two years. Previously, he was plant engineer at the company's Cincinnati catalyst plant.

F. H. Ludington, president of Chase Bag, recently attended the Century of Commerce luncheon in New York, held in recognition of companies which have done business in the city for 100 years. Mayor Impelliterri presented a certificate of business merit.

Pakistan's burlap industry has begun. The Brooklyn plant of Bemis Bro. Bag Co. recently fabricated the first bag to be made of Pakistan burlap. Pakistan loom capacity eventually is expected to be 35 million yards per month.

Sulfox-Cide is a new trade mark of **S. B. Penick** and company. It will be used for the insecticide synergist which has the chemical name n-octyl sulfoxide of isosafrole.

Thomas Ware and **Edward D. McDougal, Jr.** are new vice presidents and C. M. Edwards is new secretary of **International Minerals and Chemical** corporation. Ware has been chief engineer since 1949, Edwards has served as manager of the tax department and assistant secretary while McDougal has been secretary and general counsel since 1947.

Seaboard Oil company plans construction of a sulfur extraction plant at its Silvertip field in Wyoming. Capacity will be four to six million cubic feet of natural gas daily. The plant will employ 50 men.

Activated Chemical Fertilizer company, Inc. has filed papers for incorporation in Spokane, Wash. Capitalized at $300,000, the company's officers include Forrest M. Garrett, William Tanke, E. B. Stockdale, A. C. Kjack and Robert Grogan.

J. R. Watkins company, Winona, Minn. has been awarded a contract by the government to supply insecticides for the navy, the contract figure reading $39,880.

Midland Co-Operative Wholesale, Minneapolis, Minn., soon will start open pit mining of potash in Idaho deposits. The co-op later plans to build a $13 million plant.

Sulfur deposits have been discovered on the Sunlight Basin area holdings of the Continental Sulphur and Phosphate corporation in Wyoming. Estimated supply is 11,052 long tons. Cost of exploration was $79,400, of which the government paid half.

Monsanto Chemical's electric furnace building at Soda Springs, Idaho, now is half finished. Production is expected by October 1. Utah Power and Light company will install a 130,000-volt line to the plant site.

J. G. Bejarano is new executive vice president in charge of Julius Hyman company plant at Denver, recently purchased by Shell Chemical company. Bejarano was graduated from the University of California and joined Shell as a laborer. He formerly was head of Shell's organic solvents unit, Dominquez, Calif.

Triple damages are being sought by OPS in a suit against the Paige-Hall Seed company, York, Neb. Company is accused of $4,315 overcharging in 231 fertilizer sales to farmers. At issue is the question whether the farmer is a commercial user or a retail buyer.

Delaney: Two Views

THE Delaney committee has come and gone.

That is to say, it has completed all its hearings in the vast field it attempted to investigate, weighed evidence and testimony of many well-informed (and several not-so-well-informed) leaders in agriculture and education, and issued four reports on the various phases of the fields it considered.

Two of the reports are of prime importance to the farm chemicals industries. One report was entitled "Fertilizers" and the other "Food."

All things considered, the reports were generally favorable to the industry.

The first report, concerning chemical fertilizers and their effect on soil, crops and humans consuming those crops, gave the industry a clean bill of health and in fact praised the contribution of fertilizers to the job of feeding an increasing population.

The committee's statement, that "the situation existing in the field of fertilizers does not reveal any need at this time for federal legislation," was a welcome reassurance to producers of chemical fertilizers.

The Delaney group went on to point out that "no reliable evidence was presented to indicate that the use of chemical fertilizers presents a hazard to man or animals."

This report by the committee caused no real surprise in the industry because of the overwhelming testimony in support of the part played by chemicals in food production.

The big test came on the report on chemical additives in and on foods. Here the committee was confronted not only with outstanding spokesmen representing industry, agriculture and education but a small group of fadists as well which tried to present the ugly spectre of pesticides poisoning humans. Some went so far as to suggest that newer pesticides were to blame for virus diseases.

The Delaney committee was not unanimous in its report on chemicals in and on foods. The majority opinion, signed by Chairman Delaney and four other congressmen, recommended to Congress that "before a pesticide be used on a food, reliable methods of analysis for the determination of the chemical be available."

In summarizing its opinion, the report said:

"Chemicals have been utilized in and on the food supply of the Nation without adequate and sufficient testing of their possible long-range effects; that the public is entitled to greater protection with respect to the foods it must necessarily consume; and that such protection is not afforded by existing legislalation, under which the government may take no action until after the food has been placed upon the market and injury may have occurred. Your committee recommends, therefore, that the Federal Food, Drug and Cosmetic Act be amended to require that chemicals employed in or on foods be subjected to substantially the same safety requirements as now exist for new drugs and meat products. Adequate provisions for a comprehensive judicial review of administrative decisions should be included in such an amendment."

The minority report, signed by Rep. Walt Horan and Thomas G. Abernethy, took an opposing view on the need for additional legislation. The report declared that "adequate legal processes are already in existence for the full protection of the consuming public." In addition, the minority termed the report of the majority "reactionary and a deterrent to progress."

THE significance of both reports is that they are in full agreement on the question of the importance of pesticides to meet the needs of our ever-increasing population.

The majority has this to say:

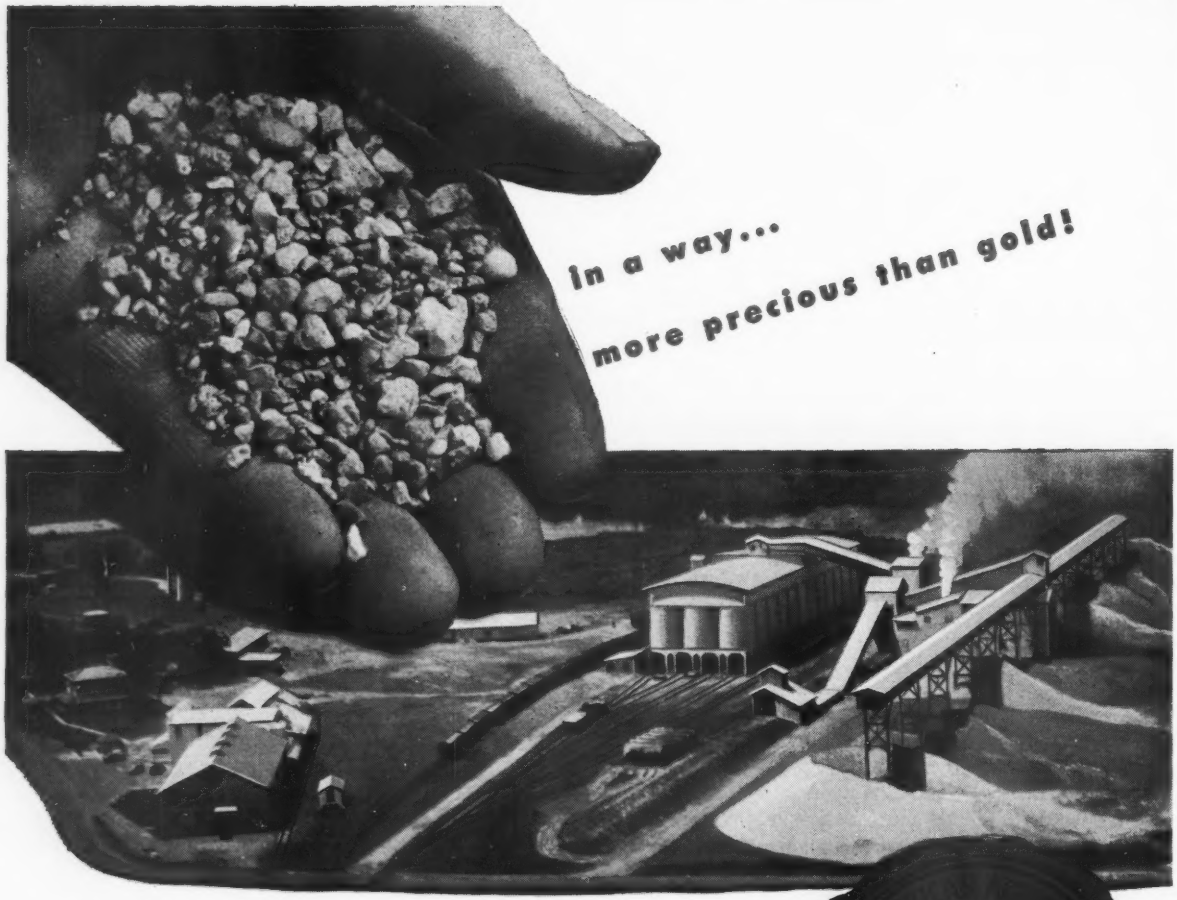
". . . it (the committee) also recognizes the necessity for the continued use of chemicals in sprays and other insecticides if the nation is to be supplied with food . . . the committee has been convinced that with proper care . . . it is possible to utilize the poisonous properties which attack many crops, without endangering the health of the people who consume these products."

The minority report cited the constant increase in world population and urged that every scientific method be used to build soil and protect crops so that food and fiber needs will be met.

It is of paramount importance to the farm chemicals industry that Congress be made cognizant of this one important fact, stressed by both groups: *farm chemicals are an absolute necessity to the continued well-being of the United States and rest of the world.*

Whatever additional legislation our representatives in Washington may decide is needed to protect the consumer, they should let that point be their guide. If it succeeds in making Congress and the nation aware of the important role of the farm chemicals industry, no matter what else may follow, the Delaney committee will have been successful.

—HAMILTON C. CARSON



Air view showing dryers and rock storage at Pierce, Florida, headquarters of A.A.C. phosphate mining operations. (Top) Sample of Florida Pebble Phosphate Rock, source of phosphorus widely used in the chemical industries, in its elemental form as well as in phosphoric acid, phosphates and phosphorus compounds. ¶ This pebble rock is also the principal source of the most important—and most generally deficient—plant food element. Often called the Key to Life, phosphorus is essential in maintaining and improving crop yields. Health, growth, life itself, would be impossible without phosphorus . . . so in a way these phosphate pebbles are more precious than gold.

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All grades of Complete Fertilizers **Superphosphate**
Gelatin **Bone Products** **Salt Cake** **Ammonium Carbonate**
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farm chemicals outlook

Report from Washington
by Fred Bailey & Don Lerch

A green light all the way. That is the unanimous short and long range market forecast for all types of agricultural chemicals as seen by experts, both private and government.

Two highly significant studies to the industry have been published in quick succession: USDA-Land Grant Colleges' survey of agricultural productive capacity, and the president's Materials Policy commission report on "Resources for Freedom."

Farms could produce 18 per cent more food and fiber by 1955 than they did in 1951, according to the productive capacity study. Translated into terms of fertilizer, experts say production of that size would take an increase of 70 per cent in amount of fertilizer used.

In total, 93 per cent more nitrogen would be needed by 1955...54 per cent more phosphoric acid...and 77 per cent more potash. Estimates for the states reflect need for more nitrogen in relation to phosphate and potash. The ratio of N,P,K would shift from the 1.00:2.03:1.05 of 1950 to 1.00:1.63:0.97 in 1955.

Corn Belt States would become heaviest users of nitrogen of any region by 1955 ...if the projected pattern of fertilizer use was attained. In 1950, Appalachian, Southeast, Delta and Pacific States used more nitrogen.

Greatest tonnage increases from 1950 to 1955 would be on corn, hay and pasture. Figures are based on a possible extension of the use of fertilizer to 45 per cent more land than was fertilized in 1950.

For all crops and pastures, the productive capacity study suggests an average rate of application of 73 pounds of plant nutrients per acre covered...compared with a 1950 rate of about 59 pounds.

Following are estimated rates of application per acre of major crops in 1950 and estimated rates attainable and "profitable" in 1955:

Cotton: N, 32.1 lbs. in 1950, 41.1 in 1955. P_2O_5, 26.6 lbs. in 1950, 32.6 in 1955. K_2O, 17.6 lbs. in 1950, and 26.7 in 1955.

Corn: N, 14.1 and 26.3. P_2O_5, 23 and 25. K_2O, 15 and 18.

Potatoes: N, 66.6 and 67.6. P_2O_5, 100 and 110. K_2O, 95 and 110.6.

Wheat: N, 10 and 17.8. P_2O_5, 27 and 28. K_2O, 16.5 and 110.6.

Tame hay and pasture: N, 4.8 and 7.1. P_2O_5, 36 and 38. K_2O, 12 and 24.

President's Materials Policy commission report is a unique and monumental study of all U.S. resources and what the future has in store for them. It looks beyond 1955 to 1975.

Reliance of U.S. on fertilizer is underscored heavily by this report. Farm production could be boosted 200 per cent above current output, the PMPC says, if maximum fertilizer is used with other good farming practices. That is admittedly only a theoretical possibility...but it indicates the prime place of chemical fertilizer in the economy and the tremendous possibility in future fertilizer markets.

Much of the future increase in phosphate fertilizer tonnage will be achieved without a corresponding increase in sulfur consumption, experts predict. Use of trace elements is expected to increase steadily to two or three times current use in the next 23 years.

Resources of raw materials: They "are not large enough to permit complacency" ...PMPC says. Nitrogen: "inexhaustible...by virtue of its existence in the atmos-

phere." Phosphate rock: four billion tons economically minable, nine billion tons potentially minable. Potash: more than 200 million tons.

Farm production forecasters have overlooked at least one potent means of providing more food and fiber: Cutting down agricultural waste from field to table.

But USDA officials plan to plug the gap. They intend to prepare a super-selling campaign urging farmers and others to use more pesticides and other conservation methods to save an estimated 30 per cent of all farm production which never reaches the consumer.

Talk is going the rounds in Washington that the government plans a crack-down on advertising claims made for new chemical soil conditioners. Some officials are said to believe that all soil conditioners are not as effective as claims say. USDA is urging gardeners to use only conditioners that have been tested by a reputable agency...like itself.

Observers point out that "over-enthusiastic" advertising claims could wreck the new market for legitimate soil conditioners.

All-out government drive on unclean food grain is working up steam. First phase—inspection and warning—already is underway. Second phase will come later—condemnation and possibly seizure.

It's designed as a slow, but pressurized operation. Food & Drug Administration says idea is to put pressure on farmers and grain elevators to clean up...knuckle-breaking crack-down if they don't. Big factor in clean-up is encouraging farmers to use more residual sprays and fumigants. USDA and Interior Department are backing F&D with field campaigns.

USDA nitrogen and phosphate expansion goals for 1955 may not be met, officials now believe. Potash expansion probably will...and before the goal date.

Steel strike is holding up new starts on some nitrogen plants, but NPA says it has received few complaints that strike is holding up progress on plants already started. But some officials fear a prolonged strike could shove fertilizer expansion program as much as a year behind.

NPA plans to crack down on firms which have been issued tax amortization certificates for construction of new nitrogen fertilizer production facilities but do not show "substantial" progress in planning. Deadline is Sept. 7. After that, officials intend to pick up T.A. certificates and issue them to other interested firms.

Fertilizer sales program being programmed by USDA will stress on-the-farm how-to-do-it. This is based on the practical theory that the individual farmer cannot use generalities...but needs to know how recommended practices can be applied to his own place. He will be shown how to do it in demonstrations by the Extension Service.

In addition to the direct approach, officials tell us the program will be backed up by other educational methods and by research covering the entire field of fertilizer use.

USDA-Land Grant College steering committee for the program, composed of about a dozen topflight men, met in July to block out the program. It is planned to get underway in time to catch next season's farm production.

Top brass says program is of such importance that all USDA agencies have been ordered to help. Fertilizer associations, fertilizer and equipment dealers and distributors, bankers and farm organizations and others having an interest will be asked to cooperate.

Fertilizer industry will be asked to play a "key role" in the proposed long-term program. It is to be patterned after the National Grasslands Program.

Reason for big push: To get eventual optimum use of fertilizer and lime to assure a balanced production of the nation's future agricultural requirements. It's tied in directly with USDA's fertilizer production expansion program.

—*USDA Photo*

U.S.D.A. entomologist sprays citrus trees in Florida. EPN insecticide has shown excellent control for citrus mites.

Ready for formulation as a dust concentrate is duPont's potent

EPN

By G. P. Teel Jr.
Assistant Editor

PESTICIDE manufacturers now are able to obtain duPont's' EPN insecticide and acaricide as a dust concentrate ready for formulation into finished dust materials. Previously available only as a wettable powder the pesticide now can be used for control of several major insects in addition to the pests successfully combatted to date.

Dust formulations of the new material have been tested on many crops including cotton, corn, onions, sugar beets, tomatoes and peaches. Used in three per cent dusts, EPN has been approved for application against the yellow striped armyworm on cotton fields. At two per cent, it has shown considerable promise when used on various species of mites infesting California cotton.

Control of Borer

In addition the material has given control of European corn borer on both field and sweet corn, the sugar beet webworm, onion thrip, russet mite on tomatoes and plum curculio on peaches.

It has been more than two and a half years since first news of EPN was released by duPont. At that time, although some evidence showed it had promise as an insecticide, the pesticide was recommended only for control of mites on some fruit crops.

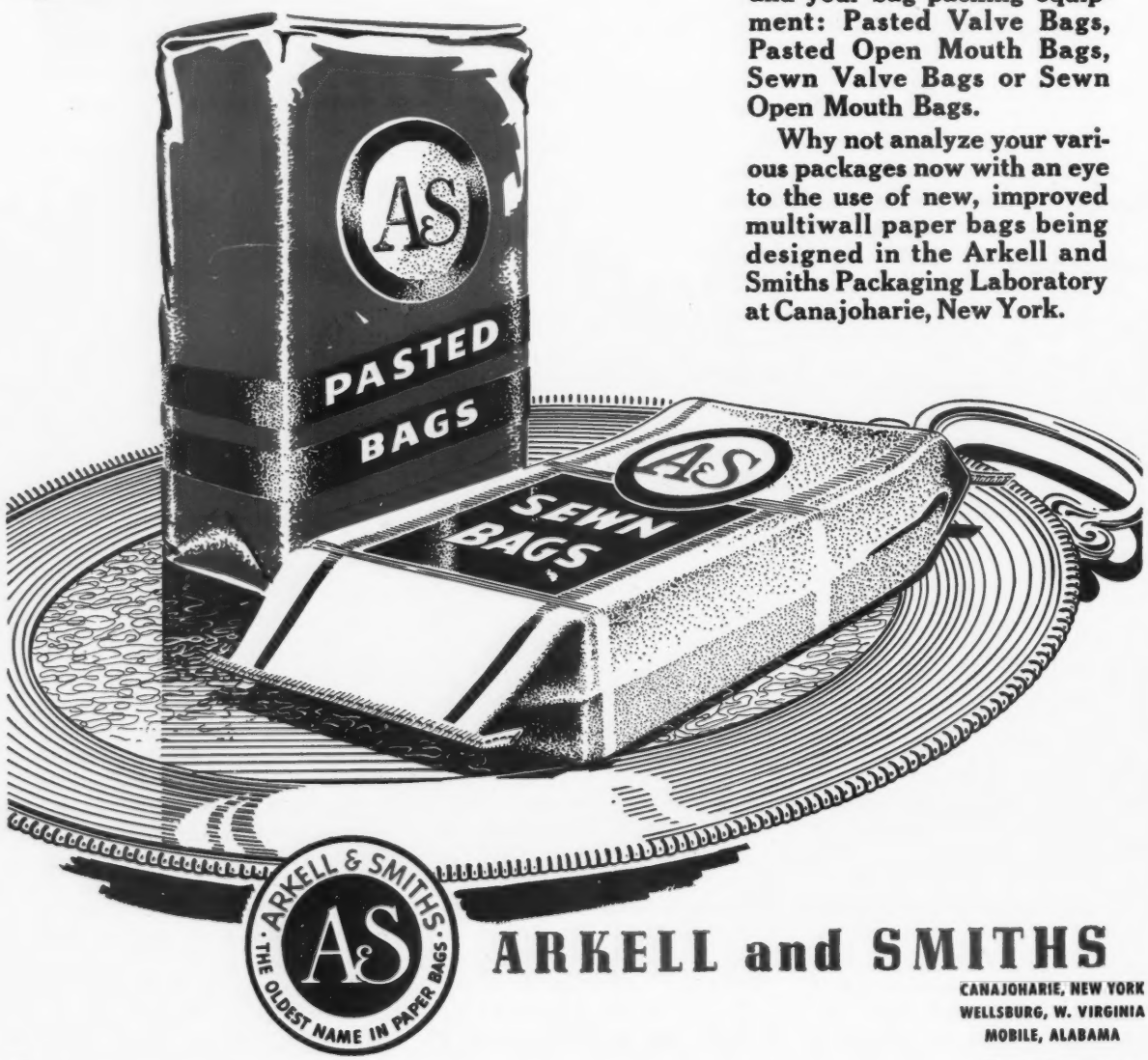
Used on pears, apples, peaches, prunes, plums and citrus plantings it was found to establish excellent control of various mites including the European red, Pacific, Willamette, two-spotted, citrus and red spider. Investigators in 21 states sent in records on the effectiveness of EPN.

Constant testing of EPN since that time shows that it can be used on a wide variety of crops

help yourself to better packaging

Practically any powdered or granular product can be packed *economically* and *attractively* in A&S multiwall bags. You have the choice of four types of multiwall paper bags with from one to six plies dependent on your product and your bag packing equipment: Pasted Valve Bags, Pasted Open Mouth Bags, Sewn Valve Bags or Sewn Open Mouth Bags.

Why not analyze your various packages now with an eye to the use of new, improved multiwall paper bags being designed in the Arkell and Smiths Packaging Laboratory at Canajoharie, New York.



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for control of mites and insects. This ability to control a large number of the more serious crop pests makes it one of the top materials available to agriculture.

Active Ingredient

The active ingredient of EPN insecticides is an organic phosphate, ethyl p-nitrophenyl thionobenzenephosphonate. In its pure state the material is crystalline with a melting point of 36° C and a vapor pressure of about 30 microns of mercury at 100° C. It is soluble in most of the common solvents but is only slightly soluble in water.

EPN 300 Insecticide, the wettable powder formulation first placed on the market, contains 25 per cent of the active ingredient. It is a light tan powder with a loose density of about 34 pounds per cubic foot and a packed density of 45 pounds per cubic foot.

Both the wettable powder and dust formulations are moderately to highly toxic and extreme care should be taken whenever the materials are handled.

Little direct data on the acute toxicity through inhalation of EPN vapors is available but there are indications that, although the vapors probably are highly toxic, the low volatility of the compound minimizes possibility of inhalation of toxic dosages.

Safety Measure

The manufacturer recommends that persons handling EPN wear respirators designed for protection against dust and organic vapor. Suggested respirators include:

American Optical respirator No. 5055 with R-55 filter and cartridge unit, two units per face piece.

Chicago Eye Shield "Healthguard" respirator style p5 PAR with "Code B" cartridge and filter No. 1000 or 1001, one unit per face piece.

Mine Safety Appliances "Comfo" respirator with filter and cartridge unit, two units per face piece.

Pulmosan DC 5100 aluminum body respirator with DMA cartridge and MN-50 or P-7 filter, two units per face piece.

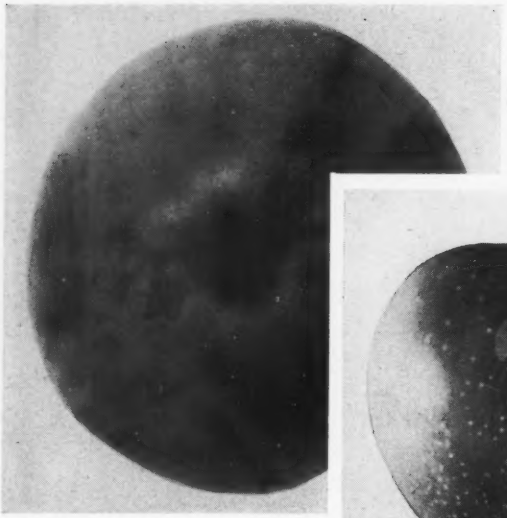
"Willson Agrisol Dust and Vapor Respirator" with R414 filter and "11-A Agrisol" cartridge, two units per face piece.

It is also recommended that persons working with EPN formulations follow these rules:

1. Wear dust-proof goggles.
2. Wear gloves impregnated with natural rubber.
3. Wear clean caps, coveralls, underwear and socks every day.
4. Shower and change clothes at close of each working day.
5. Remove protective clothing and wash face, hands and arms

Powerful truck sprayer is used to spray an apple orchard. DuPont's EPN has been tested on this crop.

USDA Photo



Left: Overwintering mites deposit eggs in calyx cup.

Right: Apple is marred by attack of plum curculios.

thoroughly with soap and warm water before eating or smoking.

EPN can be formulated with standard blending equipment if proper ventilation facilities are used. Mechanical ventilation should be used and the system fitted with a scrubber to prevent escape of toxic materials. Ventilation should be provided over the blender at the point where bags are emptied into the unit and also at a nearby location where empty bags can be collected.

Empty EPN containers should be destroyed promptly by burning or burying.

Charging the Blender

When charging the blender, the diluent should be placed first followed by the EPN. Preferred diluents include neutral or slightly alkaline materials such as the pyrophyllites, talcs (preferably micaceous), and Fuller's earth.

It can be combined with most common pest control materials with the exception of those forming highly alkaline solutions in water. When used with such chemicals (basic lead arsenate, bordeaux mixture, lime, lime sulfur, zinc and calcium arsenate and zinc sulfate-lime), residual efficiency may be reduced.

Some cases of phytotoxicity have been reported, several on apples of the McIntosh-Fameuse group and one on cucumbers. Injury to the apple group occured when the material was applied to young growth so, on these varieties, EPN is not recommended.

Experiments have shown that EPN residues on plant surfaces generally are of a low order initially and that these are degraded at a fairly rapid rate. This degradation is fast enough so that higher rates of application or more numerous treatments early in the season usually do not result in proportionately greater residues at time of harvest.

Highest EPN residues observed to date have occurred on peaches, the only crop on which values greater than eight ppm have been found. Even with this fuzzy-skinned crop, however, residues were low despite full curculio-fruit moth schedules.

Residue Problems

To avoid residue problems duPont recommends EPN application be stopped prior to harvest according to the following schedule: corn —14 days; deciduous fruits, vegetables and other crops—21 days; and citrus fruits—30 days.

EPN 300 Insecticide (wettable powder formulation) is best applied by conventional high-volume sprayers and by semi-concentrate equipment such as speed-sprayers. High concentrate units have been used but better results usually can be expected with more efficient coverage obtained through greater volumes of spray.

When applied as a semi-concentrate spray the quantity of material should be increased so the same amount of toxicant per acre is applied as in higher gallonage applications.

Results obtained when this type of equipment was used have been best where there was no cover crop or where the cover was sprayed, where trees were pruned so that limbs are not hanging in the cover and where foliage is sparse.

Because EPN has little or no fumigating action special care must be taken to obtain good coverage when using high concentrate equipment. Although this type application is not highly recommended, many instances of good results now are on record.

Recommended application rates for the wettable powder formulation run from ½ to 3 pounds per 100 gallons of water. For mite control, ½ to ¾ pound generally is used although two pounds may be necessary for control of citrus red mite.

Most insects of stone fruits for which EPN is a recommended application can be controlled with from ¾ to 1½ pounds of the material per 100 gallons of water. If peach tree borer or lesser peach tree borer are present up to three pounds may be required as a trunk spray.

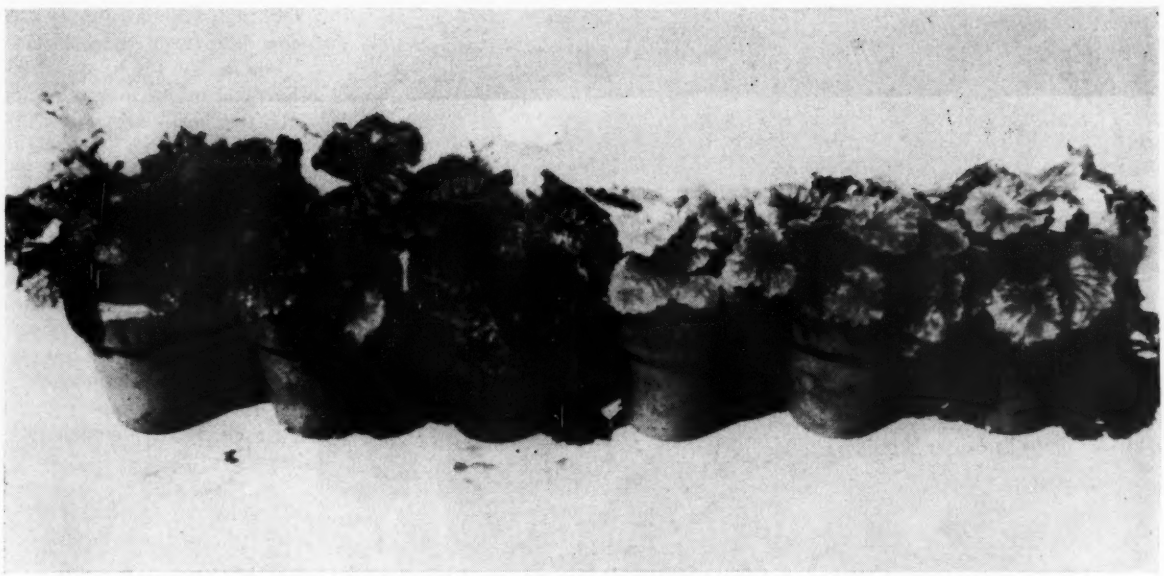
Application Rates

Other application rates for insect control on various crops include: ½ to 1½ pounds on apple and pear; ¾ to one pound on walnuts; one pound on grape; ½ to one pound per 100 gallons on vegetable and field crops; and three to nine pounds per acre on citrus.

DuPont recommends that applications should begin on fruit with the first spray following bloom, or with the first signs of infestation. EPN is a residual insecticide, but also gives an initial kill rapid enough to control established infestations.

As noted previously one of the most recent developments in the use of EPN as an insecticide has resulted from experiments showing it to be extremely effective against

(Continued on page 54)



Two applications of agricultural Frit were made to these Camillias. No deficiencies showed in control at right or Frit treated pots in center and at left but treated plants showed marked improvement over untreated.

Use of high analysis fertilizers emphasizes need for trace elements in form of

Agricultural FRIT

By E. I. Walters

Agricultural Division
Ferro Corporation
Cleveland, Ohio

SCIENTISTS of agricultural research are becoming more and more concerned with the value of the so-called trace elements.

The term trace element, or micronutrient, is applied to elements which are needed in plant growth in minute quantities while the major elements, or macronutrients, are needed in larger amounts. Although trace elements are needed by plants in very small quantities in comparison to major elements, they are nevertheless just as essential to growth or reproduction. A limited supply or an excess of one or more of the trace elements in a harmful form may limit growth of the plant considerably. Trace elements commonly found to be deficient in many soils include iron, manganese, boron, zinc, copper, cobalt, molybdenum and iodine.

Increased Need

Most soils originally contained a sufficient supply of these elements to sustain normal plant growth, but, because of an intensive farming program and use of mechanized equipment, they are not being returned to the soil and deficiencies are occurring. Trace elements are necessarily required as fertilizer applications when 1. soil tests show they are absent, 2. certain crops have special requirements for any one of the elements, 3. plants make poor or abnormal growth and 4. when soils contain active compounds to an excess that react chemically with the trace elements and thereby make them unavailable to the plants.

Normal method of supplying these trace elements has been to incorporate them in a standard chemical fertilizer which also contained major elements, and add to the soil in the normal fertilization program. It is possible also to supply trace elements as an addition to the soil separate from chemical fertilizers or to add them to plant foliage in the form of nutritional sprays.

Most trace elements used to date,

Three Primulas at right were untreated, three on left received Frit. Soil was deficient in manganese. Chlorosis appeared in untreated plants.

as soil additives or as foliage sprays, have been in the form of soluble salts. For plants to receive nutritive value from salts used as soil additives it is necessary for the salts to be readily soluble in water and to be taken up by plant roots in solution.

This creates some disadvantages. For instance, as soon as the salts go into solution they can react chemically with the soil compounds and become what is termed "fixed," or unavailable to plant growth. In other words, the trace elements are "locked up" in the soil and the only advantages a plant receives from these salts are before the complete chemical change is made.

Soil Type

Another influencing factor is the type of soil. In light or sandy soil soluble salts soon are dissipated through the sub soil. Then the plant receives only partial value from the total amount of element applied to the soil surface.

Five years ago the idea was brought to the Ferro Corporation, Cleveland, O., to develop a trace element material that would overcome some of the disadvantages cited. The idea was to make a high temperature fused material which was relatively insoluble but which still would supply trace elements to plant growth. The company was brought into the picture because of manufacturing facilities on hand and its experience in ceramic fusions in the porcelain enamel industry.

The theory was followed that a trace element material should be relatively insoluble in water to prevent elements from being lost to plant growth by leaching. Low solubility also would prevent trace elements from being made unavailable to plant growth because of chemical reactions in the soil immobilizing the elements. This means it would be necessary for the plant to absorb its nutrients from the material by contact exchange whereby plant roots come in contact with new material and absorb nutrition. It also was necessary that rate of release of elements from the material to the plant root by contact exchange be sufficient to sustain good growth.

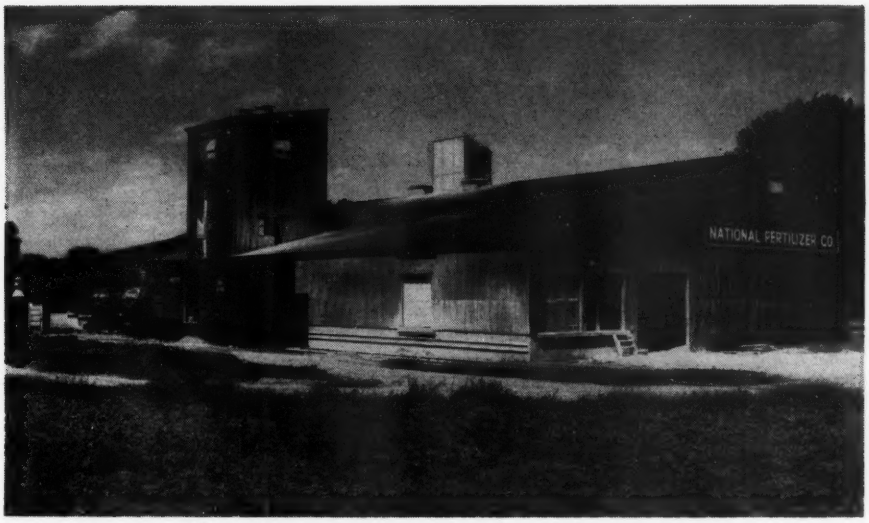
Development of Frit

Exploration of these theories resulted in development of "agricultural frit." Raw materials used for the product are mixed thoroughly according to special formulation then melted at a very high temperature. After the required length of time, at a predetermined temperature, the molten mass is allowed to flow into cold running water. When the mass strikes the water it is cooled immediately and fragments into many small pieces. The process is known as "fritting" and the resultant product is frit. After the water quenching the agricultural frit is cooled further and dried before being ground to size.

Agricultural frit basically is a glass which is relatively insoluble but which supplies trace elements to plant growth. It has been estab-

Both geranium plants were potted in good soil. One on left was grown with addition of Frit. Manganese deficiency shows on untreated plant. No deficiencies noted on plants receiving Frit.

Mr. Fred Ioerger, manager of the National Fertilizer Company plant at Des Moines.



Green Top Brand fertilizer, famous throughout Iowa and Nebraska, is made in this National Fertilizer Company plant at Des Moines. A division of National By-Products, Inc., this plant has been expanded twice in the past four years because of increasing demand for Green Top.

National Fertilizer Co.
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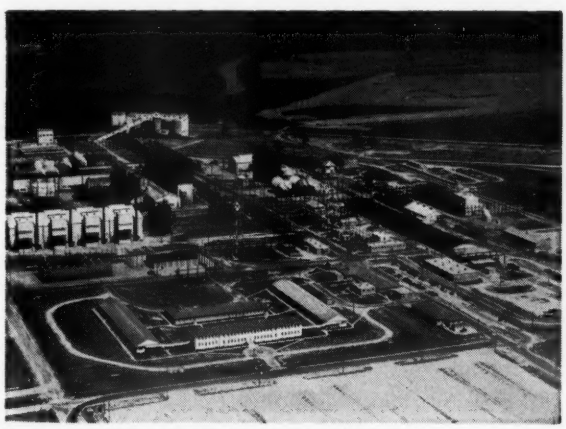

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Yield of equal rows of a potato experiment are shown in this photo. The row treated with equivalent of 200 lbs. per acre of Frit increased the yield approximately 40 per cent over that from the untreated row.

lished by scientific research that nutrients can be supplied to plant growth without being water soluble. Plant roots by coming into contact with the frit particles absorb essential elements of iron, manganese, boron, copper, zinc and molybdenum. Soil acids, principally carbonic acid, slowly disintegrate the frit, making the elements available in a slowly soluble form. The reaction provides a constant source of trace elements over an extended period of time.

This is a new approach to correcting trace element deficiencies and overcomes leaching and chemical reactions with the soil whereby elements become unavailable. Relationship of the elements is important and must be kept in balance. Plants vary in their ability to absorb trace elements and also in the requirements of these elements for growth.

Visible Symptoms

It is erroneous to assume that deficiencies do not exist unless visible symptoms are apparent. At the stage when visible deficiencies are apparent the problem has become acute.

Take for an example the element iron. At one time it was thought that only a trace of iron was necessary for good growth and that it did not matter in what form the iron was supplied as long as it was soluble in water. Recently it has been demonstrated that not only the quantity of iron but also the form in which it is presented influences plant growth.

In many cases chlorosis is considered a symptom of lack of iron and rich green color of foliage as symptomatic of sufficient iron. It is possible, however, that a supply of iron which sustains green foliage does not always result in optimum growth. This is true for all elements and the particular function they play in plant growth.

In recent seasons many field experiments have been initiated in various sections of the country using varying rates of application of agricultural frit. Many soil types were treated with frit and various records were kept, depending on crops involved. It was noted in the experiments that in many cases when agricultural frit was applied to deficient soils, the deficiencies were corrected and growth increased. In some cases where the soil was not considered deficient in trace elements frit increased the yield of the crops, showing results possible when trace elements are available in correct proportion and in sufficient supply to reach optimum growth. Agricultural frit can be supplied in sufficient quantities for optimum growth without danger of toxicity or injury to the plants.

Much work has been done on ornamental flowers in the greenhouse and on vegetable crops in the field. In the greenhouse roses, gardenias, stocks, azaleas and other flowers have shown outstanding response to the new soil additive. Potatoes, cabbage, peas and tomatoes are some of the vegetable crops which have responded well. On potatoes it was noted that vine growth was much fuller than on the untreated area and yield data showed an increase in weight and number of potatoes harvested from treated areas. In one instance the increase was 40 per cent on a soil which was not considered deficient in trace elements.

Research Work

Much scientific research work has been done in relating disease and frost resistance of crops with trace elements. Ferro is investigat-

(Continued on page 45)

Since 1937 high nitrogen has meant higher dairy income

—*for Karl Schumann, Mazomanie, Wis.*

● In 1937, Karl Schumann of Mazomanie, Wis. received a convincing demonstration of the effectiveness of Ammonium Sulphate on his own pasture. That year, he divided a four-acre field into two paddocks, and treated one of them with Ammonium Sulphate at a rate of 200 pounds per acre.

He rotated five of his Holsteins in the two areas, noticing that the grass in the fertilized area was greener, more lush and liked better by the cows. At the end of 45 days, he terminated the experiment and found the fertilized area not only produced 18 more pasture days but 2,953 additional pounds of milk.

Every year since, Mr. Schumann has used Ammonium Sulphate on his croplands with good results. Every third year he uses a 10-10-10 mixed fertilizer, and the intervening years treats his pastures with Ammonium Sulphate as a straight-nitrogen material.

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UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

Leaf treated with spray containing Ovotran Wettable miticide remains green, vigorous.

Ovotran Wettable

for maintaining a biological balance

Leaf treated only with DDT shows depletion of chlorophyl following an attack by mites.

DEVELOPMENT of DDT was a tremendous boon in the control of insects, but its advent brought several problems.

One is the widely discussed difficulty involved in attempting to control insects which have developed immunity to the pesticide.

Another is interference with biological control which has resulted in several areas where potent pest chemicals were so effective in destroying one insect, that others were allowed to run rampant.

Such was the case shortly after DDT was put on the market several years ago, in the case of the mite. Growers in all parts of the country reported mites increased rapidly after DDT destroyed the natural enemies of the bugs.

Dow Chemical company offers one solution to the problem: use its product Ovotran Wettable in combination with DDT and other pesticide materials to prevent a buildup of mite populations.

Ovotran Wettable is unique in many ways and has been very effective for control of the insect. Advantages of the pesticide are the following:

1. Outstanding destructive action to the egg stage of the mite (in fact, Ovotran Wettable is more effective as an ovicide than as an adulticide.)

2. Long residual effect. It will kill mites for several weeks after application, depending on environmental factors.

3. Low toxicity to warm-blooded animals, parasites and predators of crop pests. The company reports the product also has low toxicity to insect pollenizers which are important to crop production. By using the material, Dow states, growers have the opportunity of combining chemical and biological control in one operation.

4. Safe to use.

Very Compatible

5. Chemical compatibility with other insecticides and fungicides. It is compatible with chlorinated hydrocarbons, including DDT, toxaphene, chlordane, methoxychlor and lindane, with phosphates, arsenicals and lime-sulfur. Other materials, with which Ovotran Wettable is compatible include zinc-lime, bordeaux mixture, fixed copper fungicides, dormant and summer oils and other compounds. It is one of a very few materials which are compatible with alkaline mixtures.

Ovotran Wettable was developed by research chemists and entomologists at Dow. It is an extremely fine wettable powder containing 50 per cent p-chlorophenyl p-chlorobenzenesulfonate, and has been known as K-6451.

Dow recommends the product as a miticide for trees and ornamental shrubs on the basis of tests made by experiment stations and Dow research workers.

Most Tetranychid species of mites are controlled by Ovotran. Included are citrus red mite (purple mite), European red mite, two-spotted spider mite, Pacific mite, spruce mite, oak mite and Southern red mite. Others include boxwood mite, honey locust mite, Strawberry spider (Atlantic) mite, Williamette mite, six-spotted mite and the clover (brown almond) mite.

The material has shown miticidal effectiveness to date on citrus and deciduous fruit and nut trees, shade trees, ornamental shrubbery, cotton, melons, grapes and other crops.

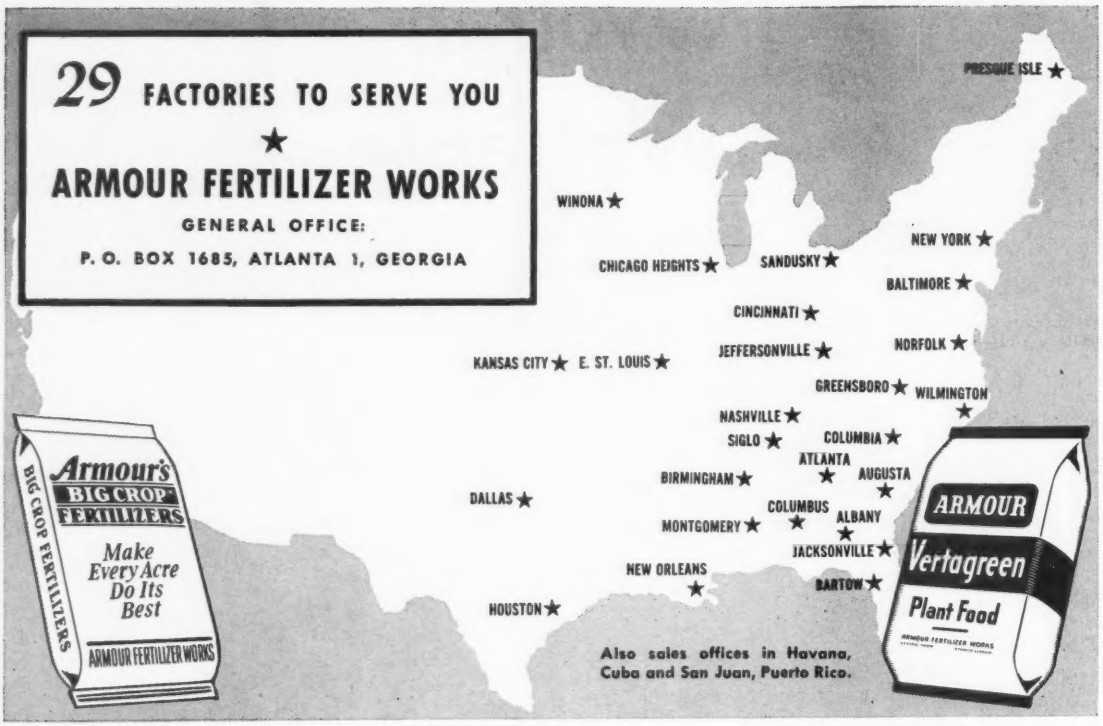
When it is used as recommended, tests have shown, the material is not injurious to these plants and trees. Two cases of sensitivity to the product, however, in black raspberry and hardy privet, have been noted.

Greenhouse Use

Care also must be taken in applying Ovotran to greenhouse roses during winter months, when sunlight is limited. Dow reports that, with a few exceptions, the miticide appears relatively nontoxic to plant foliage.

Before Ovotran Wettable was put on the market and recommended for general use, it was tested for four years in field experiments in many areas of the United States and Canada. Tests for greenhouse use were conducted at Cornell University, Colorado A&M, University of Illinois and the U.S.D.A., Bureau of Entomology and Plant Quarantine Laboratories, Beltsville, Md.

Ovotran was tested on fruit trees in Ohio, Illinois, Pennsylvania, Indiana, Kentucky, New York, New England, the West Coast and Canada. Shade tree testing was done in New York, Massachusetts, Connecticut, Ohio, Kentucky and Colorado. Cotton



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experiments have been conducted in California, Arizona, Texas, Mississippi, Louisiana and Arkansas. Tests are being conducted this season in nearly every cotton state, according to the company.

Citrus trees were tested with Ovotran in California and Florida with favorable results. The material has been used on citrus trees, grapes and melons in California in addition to cotton.

F. W. Fletcher, of the technical service and development department of Dow, emphasizes preventive rather than corrective control of mites with the chemical.

Preventive Control

"This preventive control," he stated, "utilizes several applications of a low dosage of Ovotran Wettable as a means of keeping mites at a low population level. On the other hand," he added, "corrective control measures make use of a very few applications of a high dosage of the miticide. The seasonal cost is no greater, and possibly less, with a preventive schedule and at the same time it tends to keep the new plant growth protected at all times."

Application of Ovotran may be made with standard orchard spray or mist-blower type equipment. It may be applied in both low-volume and high-volume applicators.

An interesting instance of interference with biological control by pesticides was encountered by a church group which bought a parcel of land with a stream passing through it a few years ago.

The land was used as the site for a summer camp.

Treated with DDT

The entire area was treated with DDT in 1949 and 1950 for control of house flies and mosquitoes. The pests were controlled satisfactorily but each year trees, shrubs and weeds were severely damaged by mites within a few weeks after the first treatment was made. The mites included the two-spotted spider mite, the spruce mite and a species identified as the oak mite.

The camp was divided into three areas during the summer of 1951 comparable in topography and plant life. One area was treated with a spray containing only DDT, one with DDT and Ovotran and the third untreated. All vegetation in the areas was treated from the ground to a height of 15 to 20 feet and the outsides of buildings were lightly sprayed.

Mosquitoes and flies were held to a minimum after the first treatment in the two areas, with a large population of the insects in the untreated area.

Foliage Differed

A month after the treatments were made, observers noted a difference in the condition of foliage in the area treated with DDT alone and the one which received DDT and Ovotran. In the first, foliage became bronzed and the general depletion of chlorophyl became more pronounced as the season continued. Higher, untreated portions of trees remained much greener even on trees where lower treated foliage was injured by mites.

Excellent color and vigor was noted throughout the summer on the foliage in the area treated with a combination of the chemicals. In the area treated with DDT and Ovotran careful inspections showed no injury to most species. A trace of injury in the form of small necrotic spots on a few species was noted. But whenever injury occurred, the company reported, it resulted from treatment when the foliage was young and tender.

Good Color

Dow says the use of Ovotran with DDT or certain other chlorinated hydrocarbons such as methoxychlor and lindane, in spray or dust applications, gives safe and effective control of mosquitoes, flies and mites in many areas. The treatments appear relatively nontoxic to plant foliage with a few exceptions of extremely sensitive plants such as hardy privet.

Testing on the new miticide is continuing at Dow and in many places around the country, but Ovotran Wettable already has shown excellent ability to control mites without harming plant life. Its effective combination with other pesticides is just one advantage of the potent new product. ◆

Solvay Building Chlorine Plant

Construction on the $15,000,000 Perkins Plant of Solvay Process division, Allied Chemical and Dye corporation was started recently with a flag raising ceremony at Moundsville, W. Va. The plant will manufacture chlorine and caustic soda.

Named in honor of R. H. Perkins, a retired vice president, the plant is the company's first operation in West Virginia.

Attending the luncheon and ceremony were 150 community and Solvay officials and guests.

Chadwick Speaks

Principal speaker was A. B. Chadwick, company president, who reviewed development of the company and its place in the U. S. industrial scene.

Carlton Bates, vice president, welcomed guests and introduced officials. Among those introduced were:

Perkins; H. F. Merritt, vice president; H. R. Margetts, director of operations; C. P. Hackett, assistant director of development; I. H. Munro, chief engineer; R. C. Baxter, project engineer, and H. E. Rowlands, Jr., director of public relations. Other representatives of Allied Chemical & Dye corporation were D. G. Rogers, president, and F. J. Krueger, engineering manager of Allied's National Aniline division.

Resident Manager

R. C. Skinner will be resident manager at Moundsville. Skinner formerly was supervisor of the Huntsville, Ala., government-owned chlorine plant which Solvay operated under lease for five years. He is supervising preliminary construction work at Moundsville.

The new plant will employ about 125 people.

Southwest Potash to Expand

Southwest Potash corporation plans an increase in capacity of its new potash plant. Rated capacity now is planned at about 210,000 tons of K_2O per year. Further expansion will depend upon market conditions.

Southwest Potash corporation has designed its major facilities to enable rapid expansion to more than twice initial capacity.

"Days of drama . . ."

Fertilizer Industry And Food Production

By Paul T. Truitt

IN THE fertilizer industry, these are days of sheer drama. The relationship between the use of fertilizers and the total supply of food is simple—it is positive—and it is direct. It takes enough fertilizer to produce enough food. The more people that understand this fact—what is going on nowadays and why—the better for the nation tomorrow. The fertilizer industry has performed a great and vital service for this country in the past.

The future is more than challenging!

The future is practically unlimited in the extent to which the fertilizer industry will have the opportunity—and responsibility—to produce an even greater abundance of food and fiber to feed a dynamic and growing population.

Truly, in the future, more must grow where less grew before!

Great advances have been made in hybrid seed—in farm mechanization—and in other good farming practices. These have already—and will continue to add their significant increases to total food output. But—these are not enough.

Dangerous—indeed—is the old concept of a permanent and enduring agricultural surplus in this country. Many of us, conditioned by experience, think mostly in terms of surpluses. In the past, the "horn of plenty" has often run too full, but that may not always be our experience. A succession of good crop years, as in the recent past, may not continue indefinitely. New ideas and innovations in agriculture likely cannot be relied upon to produce the additional food and fiber to meet the total need. But, let me assure you that the proper use—of the right amount—and of the right kinds of plant food—on the land we have—can do the job.

Paul T. Truitt

Today, without fertilizers, our food supply would be cut by about one-fourth, or 25 per cent. Tomorrow, with relatively the same number of acres, and with more people to feed, this percentage will be even higher, and the greater use of fertilizers will become even more necessary. We simply cannot produce enough food to keep up the present standard and level of the national diet without widespread—proper—and abundant use—of the right amounts of fertilizers.

Why is this true?

The population is growing rapidly—7,000 per day—or about 50,000 per week—over 2,500,000 a year.

The acreage of arable land has been expanded almost to its limit.

The number of farm laborers is declining, and today, more people depend for their food supply on the efforts of fewer people than ever before in our history.

Statistics speak forcefully and descriptively in appraising what fertilizers have done in the past to increase production. Often, the past forecasts the future. And, so it is today in the fertilizer industry.

Steady Growth

Figures on fertilizer consumption show a slow but steady growth between 1900 and 1940.

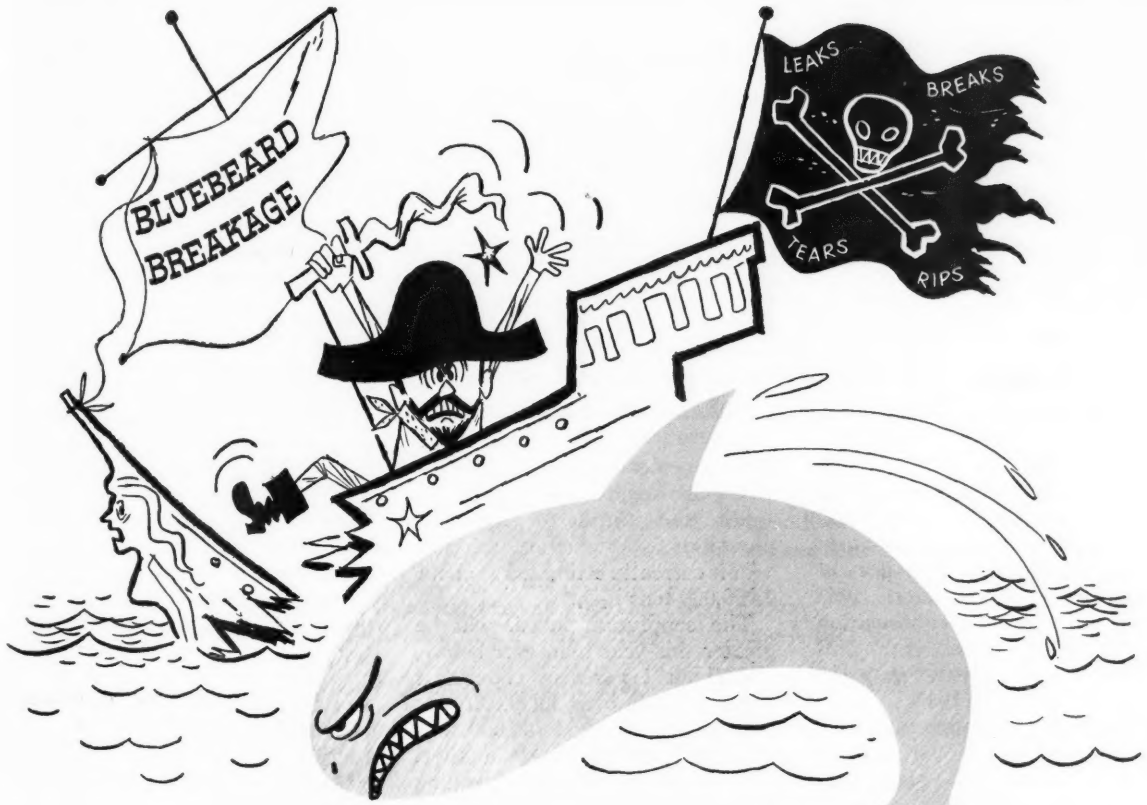
The 1940–50 decade, however, marks the fertilizer revolution.

Why?

In the 1940–50 decade, our country was faced with unprecedented demands for more food for ourselves and for our allies. Our farmers met that demand, but only by the use of what then seemed to be astronomical quantities of fertilizers. True, other factors played their important roles, but without fertilizers, the goals would not have been met.

Who, in retrospect, can appraise the value of having had enough food and fiber in the 1940-50 decade? Or, who can calculate the magnitude of the disaster of not always having enough in time of peace or war?

Since the end of the 1940–50 decade, there has been no let-up in



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PLANT FOOD CONSUMPTION IN THE UNITED STATES

Period	Nitrogen	Available Phosphoric Acid	Potash	Total Tons	Total Fertilizers
	Tons (N)	Tons (P_2O_5)	Tons (K_2O)	(N, P_2O_5, K_2O)	Tons
1900	62,000	246,000	87,000	395,000	2,730,000
1910	146,000	499,000	211,000	856,000	5,547,000
1920	228,000	660,000	257,000	1,145,000	7,296,000
1930	377,000	793,000	354,000	1,524,000	8,425,000
1940	419,000	912,000	435,000	1,766,000	8,656,000
1950–51	1,285,000	2,235,000	1,445,000	4,965,000	19,500,000 est.
Increase since 1940	866,000	1,323,000	1,010,000	3,199,000	10,844,000
Estimated supply 1951–52	1,375,000	2,100,000	1,515,000	4,990,000	20,000,000 est.

the race to produce enough for all. In fact, if present indications prove accurate, fertilizer production and use in 1952 will be larger than in any previous year in the history of the industry. Furthermore, 1952 production marks the continuation of a trend in which each year's production has been greater than the preceding year since 1938.

Now, for a look at the future.

Other new highs are coming soon!

Let us consider the short-term outlook first.

The 1952 spring movement started slowly. In some areas, it has been spotty. In other areas, consistently ahead of last year. Generally, supplies will be tight for this crop year, but larger than last year. Revised estimates, however, indicate the total supply picture may be improved over earlier forecasts.

The chances are the supply of nitrogen will be up about 10 per cent, instead of 5 per cent as earlier estimated.

Shortage of Super

The shortage of superphosphates previously estimated at 8 to 10 per cent may turn out to be no more than 6 per cent, leaving the supply about the same as last year despite the cut in sulfur. The reasons for this, according to the Defense Production Administration, are:

(1) The higher rate of operation of the superphosphate industry during the current calendar year.

(2) The expected increase in the use of spent and metallurgical acid.

(3) Base period adjustments made in sulfur usage under NPA's sulfur order M-69 as amended.

In addition, the recovery of sulfur and sulfuric acid from various by-product sources has added to the total supply, tending to increase the output of available phosphate. Production for this year is currently estimated at about 2,000,000 tons P_2O_5.

The supply of potash will be greater this year than ever before, and about 5 per cent above last year. Slightly over 3,000,000 tons of salts, containing 1,700,000 tons of K_2O, were produced in 1951. The potash industry is expanding to meet current needs, both by enlargement of existing facilities and by entrance of new companies into the business. Further, in 1951, imports reached a new high of 325,000 tons K_2O.

What is being done to make certain we all will eat at least as well in the future as in the past?

For a long time, as many of us know, the USDA has been concerned quite intensively with production and proper use of fertilizers. With the advent of the Korean war it became clear that fertilizer output must be expanded sharply and relatively quickly—the year 1955 being the immediate target date. The acute shortages of nitrogenous fertilizers caused the attention of the USDA, the National Production Authority, the Defense Production Administration, and the fertilizer industry itself to be focused on nitrogen, first.

Mr. Truitt is president of the American Plant Food Council. This article is taken from an address before the Second Annual Conference of the National Institute of Animal Agriculture, Purdue University, Lafayette, Ind., April 22, 1952.

Referring again to statistics, fertilizers used 419,000 tons of nitrogen in 1940; 1,285,000 tons in 1950–51, and will have about 1,375,000 tons, perhaps more, in the present year, and this is not enough. Until we have more than we can sell, we will never know how much the farmers will buy.

Work Together

The government and industry, working together, now have completed a nitrogen expansion program. This program is supported fully by the nitrogen-producing industry, with its own capital. The program is not bolstered with government defense loans—certificates of accelerated tax amortization are the only aids offered by the government to effectuate the program. Enough new nitrogen capacity now is authorized—and part of it is already being built—to bring the total nitrogen for agriculture up to 1,565,000 tons in 1952–53; 2,000,000 tons in 1953–54; and 2,185,000 tons in 1954–55.

Nitrogen expansion is only one part of the whole fertilizer program.

It has been decided to expand phosphatic fertilizers and potash on an approximately equal basis with nitrogen. At this date, the government agencies—the USDA, NPA and DPA—have not announced details of the phosphate and potash programs. It is understood that the amount of available P_2O_5 will be increased by 1955 to about 75 per cent above the present rate—or to approximately 3,485,000 tons P_2O_5 for fertilizer.

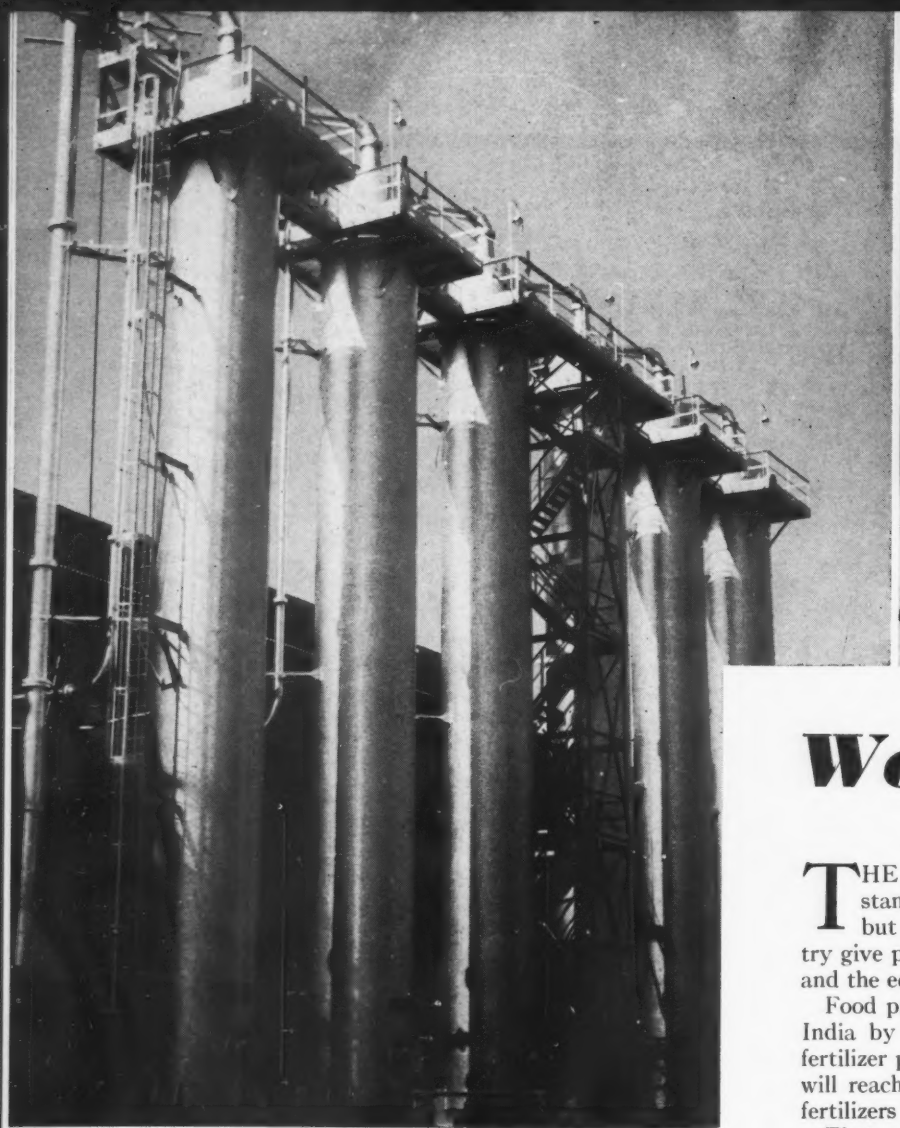
The program now under consideration—but, also, not in final form—calls for an increase in the production of potash of approximately 50 per cent above the present rate—or to something over 2,000,000 tons by 1955.

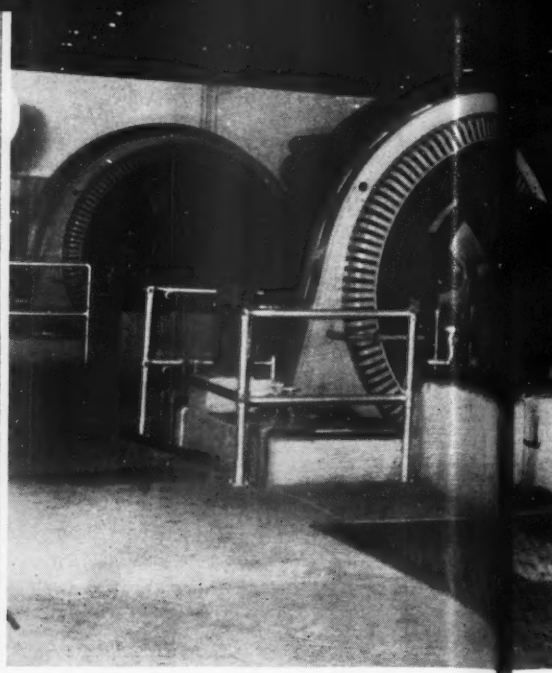
By now I think three very significant points have been established:

(1) The nation must have more food—meat and livestock products—in the future, than it has produced in the past.

(2) The required increase, while influenced by many factors, will depend more than ever on the use of larger amounts of fertilizers. And—

(Continued on page 48)





World's Largest Fe

Largest

THE old story about famine, poverty and low-standard of living in India still is largely true, but recent strides in the farm chemicals industry give promise of great improvement in agriculture and the economy in general.

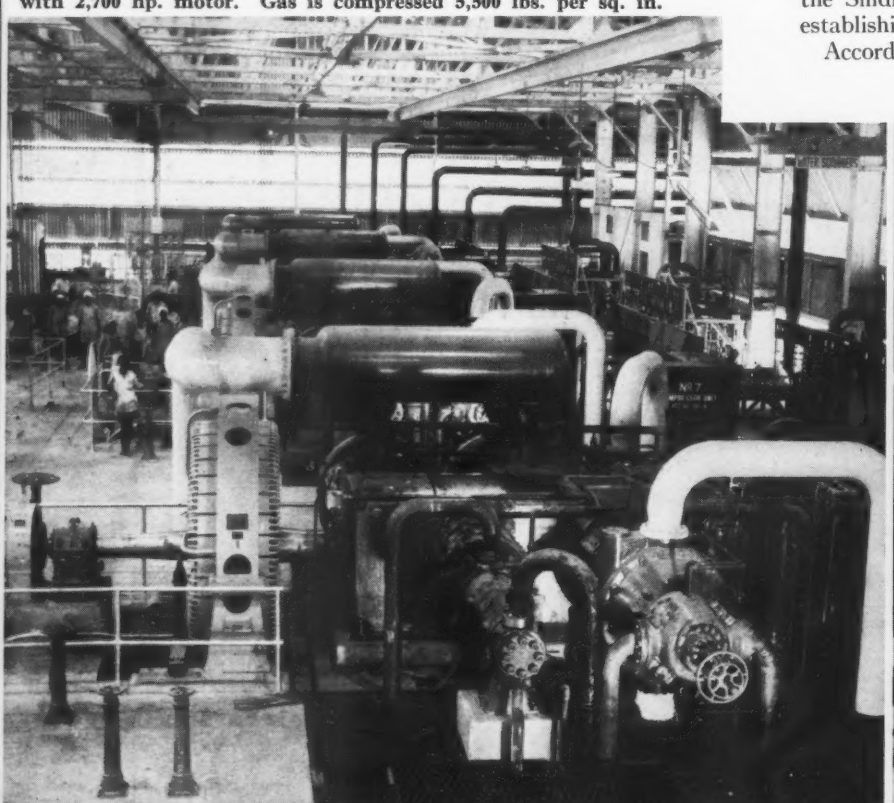
Food production is being spurred tremendously in India by recent construction of the much-heralded fertilizer plant at Sindri, in the state of Bihar, which will reach a production of 350,000 tons of chemical fertilizers next year.

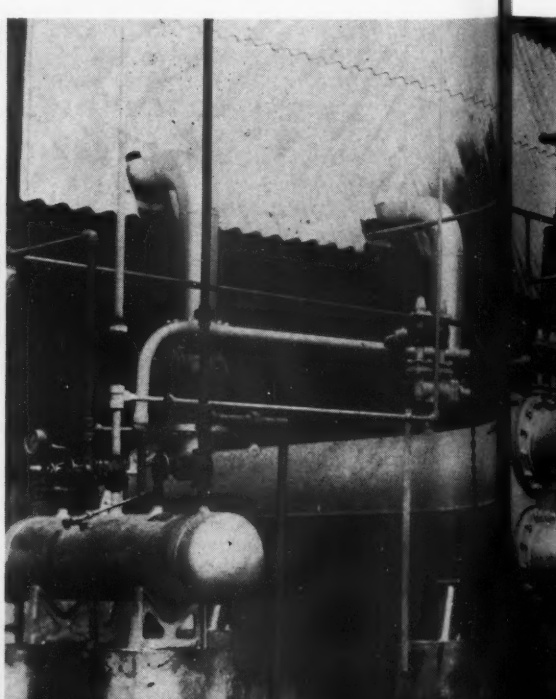
That means an annual food increase of 875,000 tons to the Indian people.

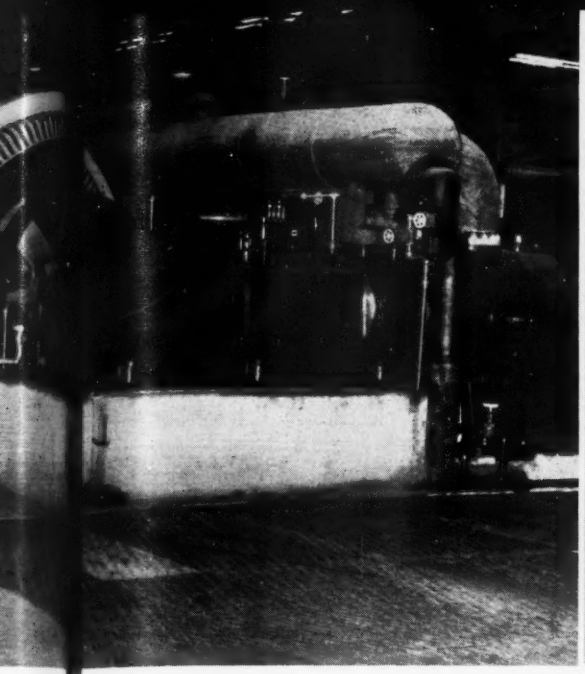
Indian agricultural leaders also hailed opening of the Sindri plant in March as a major step toward establishing a heavy chemicals industry in the country.

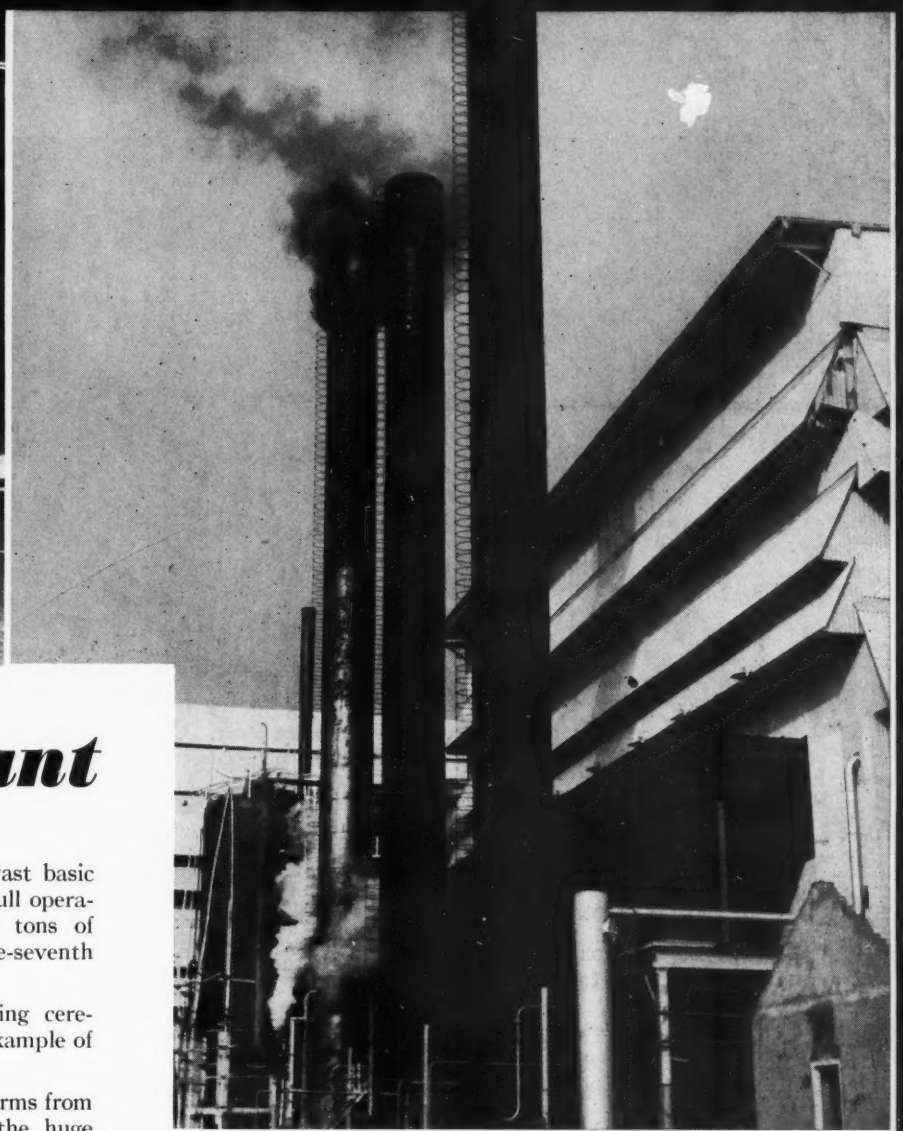
According to India's Ministry of Industry and

Top Center: Two of five Worthington compressors which recirculate synthesis gas in Sindri plant. Above: Six carbon dioxide scrubbing towers, 75-feet high, located in synthesis section. Below: Synthesis section, showing eight multi-stage gas compressors with 2,700 hp. motor. Gas is compressed 5,500 lbs. per sq. in.









...ge Fertilizer Plant

Fertilizer

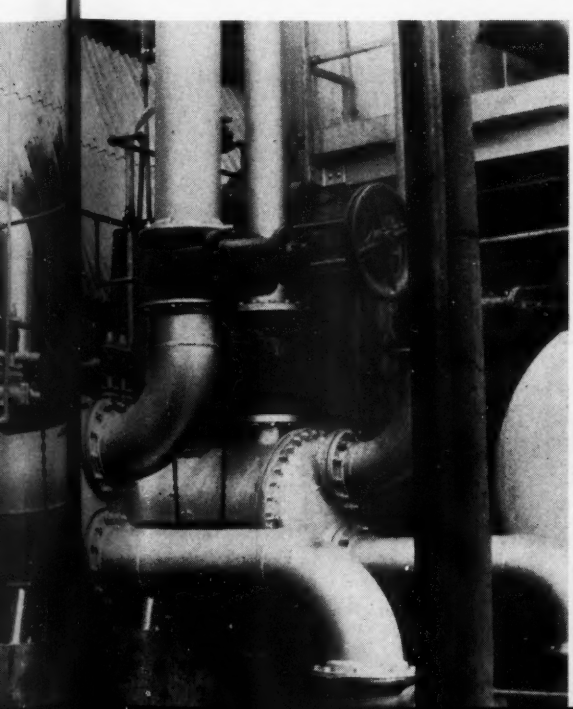
Supply, the plant is the "beginning of a vast basic chemical engineering industry." When in full operation, it will produce more than 350,000 tons of ammonium sulfate a year, approximately one-seventh of the nation's fertilizer needs.

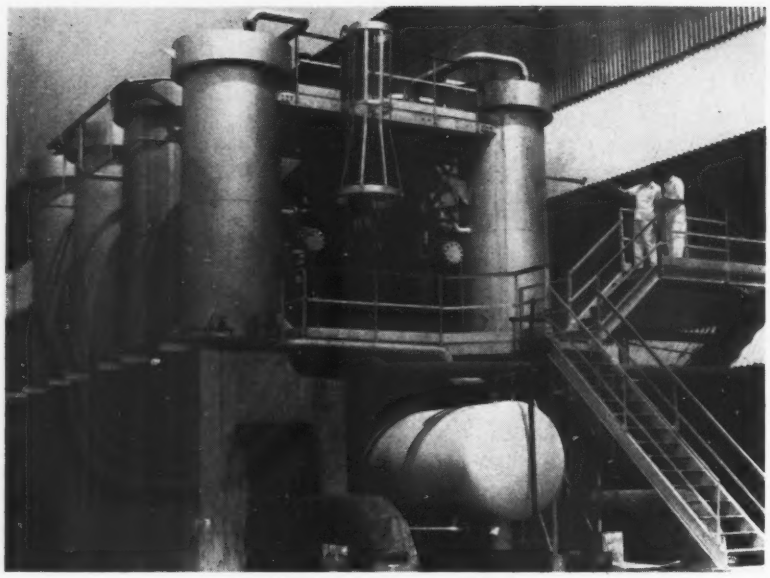
Prime Minister Pandit Nehru, at opening ceremonies of the plant, characterized it as an example of "international fellowship in construction."

The statement was very appropriate, for firms from several nations aided in construction of the huge plant—largest fertilizer plant in the world.

Included among firms which furnished equipment for the Sindri plant are three American concerns—American Pulverizer company, St. Louis; Cooper Bessemer company, Mt. Vernon, N. Y. and Worth-

Above: Boiler and turbine house in Sindri plant. Power house receives 1,400 tons of coal a day. Bottom Center: Purified and compressed nitrogen-hydrogen mixture is delivered to the synthesis system, to be mixed with gases at the circulator outlets. Below: The plant's semi-water-gas plant and gasholder using eight generators.





Two rows of four condensers at the Indian plant. Ammonia vapor is cooled by four refrigeration plants in synthesis section of the unit.

ington Pump and Machinery corporation, Harrison, N. J.

Experts Contribute

Experts from many other nations contributed to the construction of the plant.

Chemical Construction company, of the United States, was responsible for designing and supervising construction. Power Gas corporation of the United Kingdom acted as procurement and supply agent and top engineers for the job included one each from the United Kingdom, Germany and Japan. Other personnel was Indian.

The plant was designed by Chemical Construction to provide for eventual expansion which would double output and for selective expansion for production of additional chemicals to be used as raw materials in other plants. Design of the Sindri plant was started in 1945 and construction in 1946. Production started last October.

Present output at the plant is only one-third capacity because of a shortage of high grade gypsum, which is used in production of ammonium sulfate. The partition of Pakistan and India is blamed for the shortage but lower grades of gypsum available in India soon will be used to permit capacity operation.

Everything about the Sindri plant is big. It consists of the following equipment:

An 80,000 kw. power generating station (3600 kw. for the fertilizer plant and the remainder for the Bihar grid);

A gas plant which generates 33,000,000 cubic feet of hydrogen and nitrogen;

Synthesis Plant

An ammonia synthesis plant where the two gases are combined to produce 300 tons of anhydrous ammonia a day; and

A sulfate plant where ground gypsum is reacted with ammonia and carbon dioxide to produce ammonia sulfate fertilizer with calcium carbonate as a by-product.

The big scale layout includes railroad sidings and a marshalling yard consisting of 12 miles of track and a huge air-conditioned silo with a storage capacity of 90,000 tons. The silo is one of the biggest of its kind in the world. It is a parabolic arch reinforced concrete structure 150 feet wide, 90 feet high and one-eighth of a mile long.

To accompany the enterprise, a complete township was built by the Indian government. It includes 40 staff bungalows, 800 workmen's quarters, all with modern facilities and electricity, schools, stores, hospitals and recreational facilities and six miles of roads.

Training in chemical, mechanical and electrical engineering is offered by a nearby college in connection with the plant.

Equipment supplied to Sindri by American factories includes ring-type crushing mills from American Pulverizer, eight horizontally opposed staggered six cylinder stage compressors with a 14-inch stroke, from Cooper Bessemer company, and five electrically driven ammonia compressors with condensers and associated equipment and five recirculating compressors from Worthington Pump and Machinery corporation.

Five years ago the site of the Sindri factory, on the Damobar river was worn out farm land. Now it is the location of the world's largest fertilizer plant, a leader in the farm chemicals field that is helping India in its centuries-old battle for self-sufficiency. ◆

Atomic Energy In Ag Is Topic

The Oak Ridge National Laboratory and the Oak Ridge Institute of Nuclear Studies, in conjunction with the University of Tennessee-Atomic Energy Commission Agricultural Research Program, is planning the fourth annual Oak Ridge summer symposium on "The Role of Atomic Energy in Agricultural Research," Aug. 25–30.

Atomic Energy commission scientists scheduled to speak include Dr. P. C. Aebersold, on the general outlook of isotope utilization; and Dr. G. G. Manov, whose talk is entitled "Design of Agricultural Radioisotope Laboratory."

Other speakers and their topics are Dr. C. S. Simons, Oak Ridge Institute of Nuclear Studies, "Instrumentation for an Agricultural Radioisotopes Laboratory;" Dr. C. L. Comar, UT-AEC Agricultural Research Program, "Isotope Methodology and Miscellaneous Agricultural Applications;" Dr. S. Aronoff, Iowa State College, "Carbon-14 Studies in Photosynthesis and Translocation" and Dr. Sterling R. Olsen, Colorado Agricultural & Mechanical College, "The Measurement of Phosphorus on the Surface of Soil Particles and Its Relationship to the Plant-Available Phosphorus."

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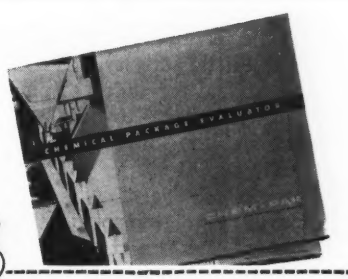

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FERTILIZER MATERIALS MARKET

New York

July 10, 1952

Sulfate of Ammonia

Due to the prolonged steel strike, production of this material is very low except from material being produced by synthetic plants and utility plants which are not affected by the strike. The price of imported material is too high to bring to this country.

Nitrate of Soda

With the end of the recent strike in Chile, nitrate of soda is available to the trade for prompt shipment. No price changes are noted.

Ammonium Nitrate

This material continued in demand and shipments are being made against orders as fast as the material is produced.

Nitrogenous Tankage

With leading producers sold out for the balance of the year, this material was difficult to locate. Prices ranged around $4.90 to $5.00 per unit of ammonia ($5.95 to $6.08 per unit N), f.o.b. production points.

Organics

Organic fertilizer materials were quiet and little activity was noted. Soybean meal for quick shipment was a little hard to locate but futures could be bought at the ceiling price of $81.00 per ton, f.o.b. Decatur, Ill. in bulk. A considerable quantity of imported cottonseed meal was offered for July arrival at around $88.00 per ton, c.i.f. Atlantic ports, for 41 per cent protein material, which was under the domestic delivered price. Linseed meal was also available for shipment from abroad while domestic material was very difficult to locate.

Fish Meal

Aside from certain points in the Gulf, fishing along the Atlantic Coast was said to be rather poor this season and little change was heard in prices. Scrap was quoted at about $125.00 per ton, f.o.b. fish factory, with the meal about $10.00 per ton higher in bags. Foreign fish meal continues to arrive from abroad at competitive prices.

Bone Meal

Steamed bone meal is reported moving better to the feed trade with some fertilizer buying noted. Imported material is available at around $70.00 per ton, f.o.b. ports.

Hoof Meal

This material is slightly lower in price and some reports of material selling at $6.30 per unit of ammonia ($7.65 per unit N), f.o.b. Chicago.

Garbage Tankage

Contracts have recently been made for shipment during the coming season at the price in effect during the past season and most producers are sold out.

Superphosphate

With the heavy fertilizer shipping season over, this material is back once again in normal supply and there is not any reported shortage for immediate needs. No further price changes are noted.

Potash

While most domestic producers already are sold out, foreign potash continues to be offered at competitive prices of about 62 cents per unit, c.i.f. regular Atlantic and Gulf ports. Several domestic producers still are trying to get the O.P.S. to grant them an increase of 2 cents per unit to 44 cents but so far this request has not been granted.

Philadelphia

July 10, 1952

With the close of the 1951–1952 fertilizer year, the raw materials market is rather quiet. The steel strike still is unsettled, thus cutting the coke-oven sulfate of ammonia supply. Ammonium nitrate continues short of demand. Blood and tankage are easier. Fish meal is quiet and bone meal demand is slow. Superphosphate is reported tight with active contract interest. Domestic potash seems well able to supply the demand.

Sulfate of Ammonia.—Majority of steel mills are still on strike and these plants have made no shipments of sulfate for over a month. The present effect is not too serious as the mixing season is about over.

Nitrate of Ammonia.—Demand is active but supply exceedingly tight.

Nitrate of Soda.—Imports arrive regularly and conditions are rapidly approaching normal. The demand has subsided somewhat.

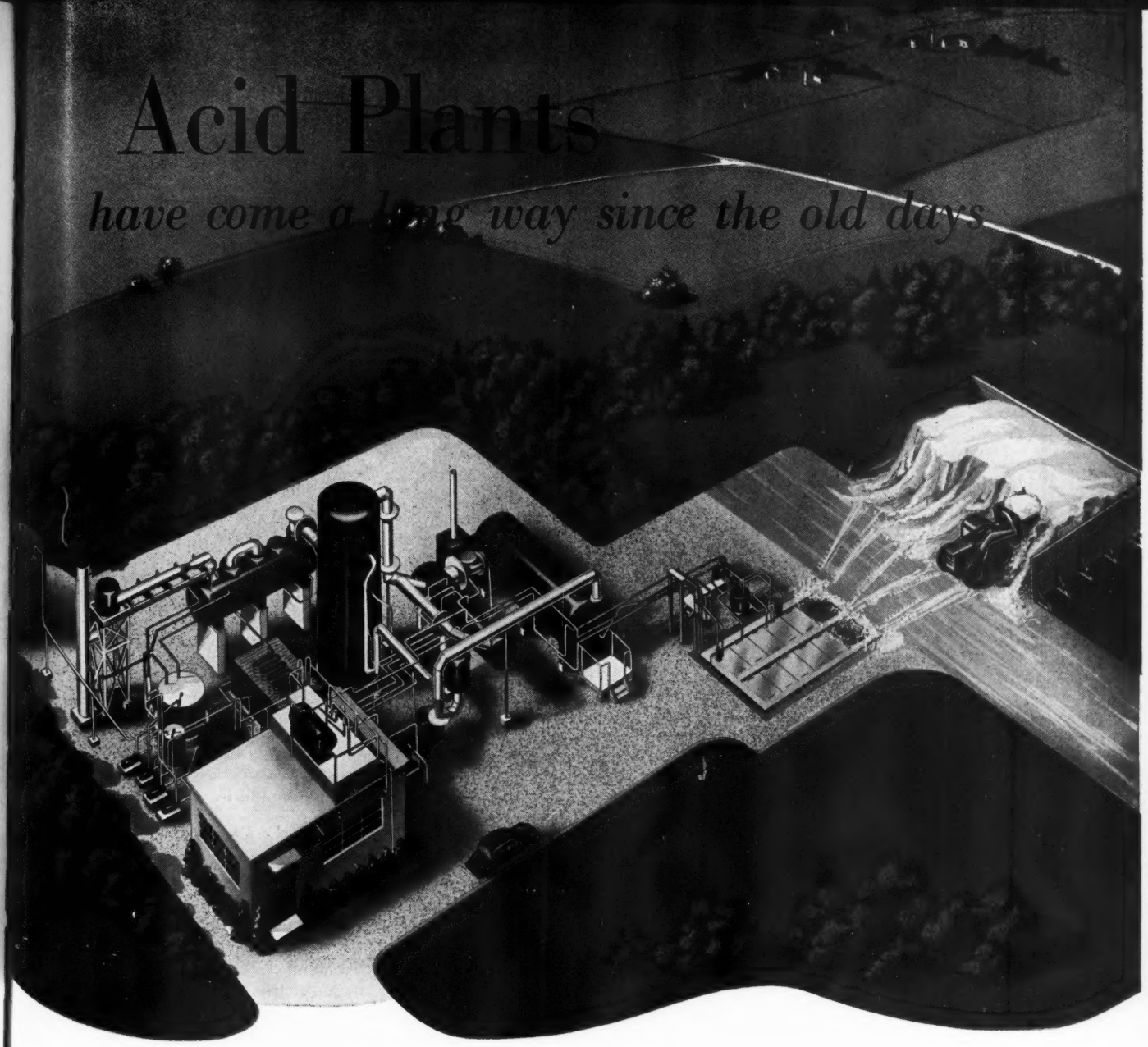
Blood, Tankage, Bone.—Blood and tankage are in rather dull position and priced nominally at $6.25 to $6.75 per unit of ammonia ($7.59 to $8.20 per unit N). Bone meal is also quiet, with raw meal quoted at $70.00 per ton and steamed at $75.00. Hoof meal commands no interest at present.

Castor Pomace.—Limited offerings have been reported at $37.25 per ton.

Fish Scrap.—While fishing operations are said to be satisfactory, menhaden meal is without much interest and quoted at $135.00 per ton.

Phosphate Rock.—Domestic demand is sufficient to prevent accumulation of stocks. Large supplies of superphosphate in Europe tend to restrict the export movement from this country.

Superphosphate.—Contract shipments are moving regularly, but spot business is extremely limited.



At the turn of the century, virtually all sulfuric acid was made by the chamber process. A 50-ton per-day unit was a large installation and chamber acid had a maximum strength of 77 per cent.

Today's contact acid plants are a far cry from the old days. Units are modern and functional in design—efficient and reliable in operation. Single units producing up to 500 tons per day are becoming commonplace and acid of any strength is produced.

Chemico is responsible for many of the developments that account for this vast improvement. Chemico pioneered and pointed the way in the use of—

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g. Quench converters for high catalytic conversion

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Chemico plants are profitable investments

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While production seems to be ahead of last year, fear is freely expressed that the general demand will exceed the supply. Price range is indicated at 86 cents to 88 cents per unit.

Potash.—Shipments continue to move against contracts and most producers are reported fully sold ahead. It is thought some buyers are calling for more than their actual requirements.

Charleston

July 10, 1952

Superphosphate continues in relatively tight supply position. Sulfate of ammonia is now quite short of demand. Potash supplies are in balance with current demand and fertilizer manufacturers are in the process of planning and purchasing supplies for the new season.

Organics.—Interest in fertilizer organics is primarily for fall and spring shipment. Domestic nitrogenous tankage is nominally priced at $4.60 to $5.00 per unit of ammonia ($5.59 to $6.08 per unit N), f.o.b. production points, in bulk. Offerings of imported nitrogenous are light at prices varying from $5.90 to $6.00 per unit of ammonia ($7.17 to $7.29 per unit N), in bags, c.i.f. Atlantic ports.

Castor Pomace.—Supplies in limited quantity are available for summer and fall shipment from domestic sources at $37.25 per ton in burlap bags or $2.00 less if shipment is in paper bags, f.o.b. Northeastern production points. Guaranteed analysis is 6.75 per cent ammonia.

Dried Blood.—Unground bulk cattle blood is indicated at $5.75 to $6.00 per unit of ammonia ($6.99 to $7.29 per unit N), delivered Chicago area. The New York market is around $6.50 ($7.90 per unit N), with activity slack.

Potash.—Domestic producers are currently shipping at the price of 42 cents per unit, f.o.b. Carlsbad, in bulk, for muriate of potash and production is heavily under contract for the new season. Movement is good at present. Imported muriate of potash is offered at prices varying from 60 cents per unit K_2O, ex vessel, to the delivered cost at buyer's plant at the ports as offered by domestic sources. Imported sulfate of potash is offered by one importer at 94 cents per unit K_2O, ex vessel at principal Atlantic ports.

Ground Cotton Bur Ash.—Best production of this source of potash, primarily in the form of carbonate of potash, is available for prompt and spread shipment through the new season. The price is somewhat lower than during the past season making the material competitive, and in many cases, more economical than domestic sulfate of potash. This production tests 40 per cent K_2O.

Phosphate Rock.—The situation at the mines is fluid, with production being taken sufficiently fast as to prevent large accumulation of stocks. No change in basic price has been noted.

Superphosphate.—Production continues at a high level and demand quite strong with little surplus accumulations.

Sulfate of Ammonia.—The current strike at the steel mills has reduced production considerably. The market is definitely tight with no easement in sight at present.

Nitrate of Soda.—Market conditions are normal and demand seasonal. Current supplies are adequate.

Calcium Ammonium Nitrate.—Importations of this form of ammonium nitrate have been delivered for this season and offerings for the new season have not yet reached the market.

Federal Chemical Buys Site for Fertilizer Plant

Federal Chemical company, Louisville, Ky., has announced purchase of a 40-acre site for a new fertilizer plant at Danville, Ill. Building plans call for a modern factory for manufacture of complete fertilizers and superphosphate. The company estimates that at least 50 employes will be required to operate the plant, starting early in 1953.

Industrial News

New Products **New Plants** **New Appointments**

Mehring Retires From USDA Post

After 38 years of government service, Arnon L. Mehring, U. S. Department of Agriculture fertilizer expert, has retired to his home in Hyattsville, Md.

Mehring received his B.S. degree from George Washington University in 1922.

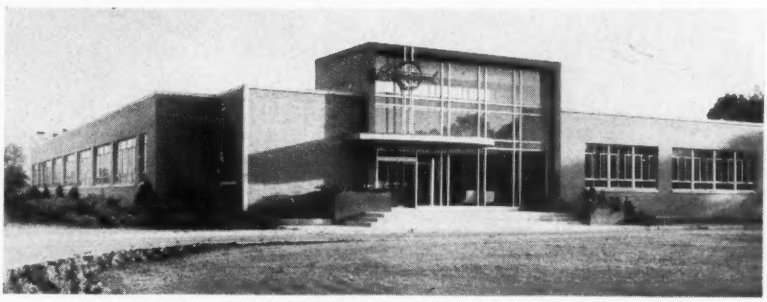
He constructed an electric furnace at Arlington Farm, Va. and worked on the process for volatizing phosphorus from phosphate rock. The perfected process now is in commercial operation. Mehring also was engaged in the following projects: a new method for preparation of potassium nitrate, granulation of fertilizers, factors affecting drillability, fertilizer placement in cotton planting, efficiency of fertilizer distributors, effects of irregular distribution on cotton yields, measurement of drillability, methods of reducing fertilizer costs to farmers, elimination of unnecessary filler, higher analysis grades, complete composition and effects of particle size on fertilizer efficiency.

Substitution of dolomite for sand as a filler was advocated by Mehring in 1934. His efforts were responsible for the fact that in 1937 nearly half a million tons of dolomite were used in making mixed fertilizers.

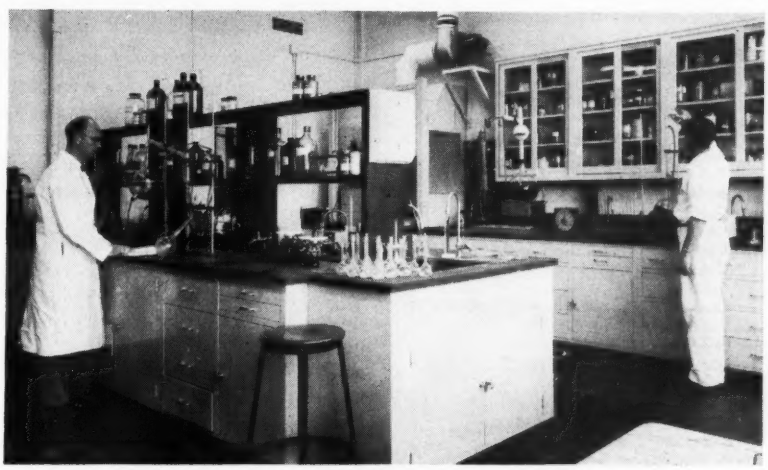
At the request of the National Fertilizer Association in 1934, Mehring made the first survey of plant nutrient consumption in the United States.

During World War II he served as consultant on fertilizers to P. H. Groggins, chief of the Agricultural Chemicals division of the Office of Agricultural War Relations. His duties included helping locate new synthetic nitrogen plants, arranging of fertilizer shipments to avoid unnecessary long hauls and organization of the fertilizer industry advisory committee.

International Opens New Research Lab in Illinois



New general research laboratory recently built by International.



One of the labs at International Min. & Chem. Skokie, Ill. plant.

Three days of inspection marked the opening of International Minerals and Chemical corporation's new general research laboratory in Skokie, Ill.

Guests included company directors and employes with their families and prominent citizens of the Chicago area.

Of modern, fireproof construction, the new laboratory will house a staff of scientists and technicians working on the corporation's broader research projects. Enough ground has been acquired to provide for ultimate erection of an office building adjacent to the laboratory. This will make possible centralization of a large part of International's research operations, according to the company.

Approximately 75 research people will be employed by the laboratory on projects relating to the production and use of the corporation's present products and to the development of new products.

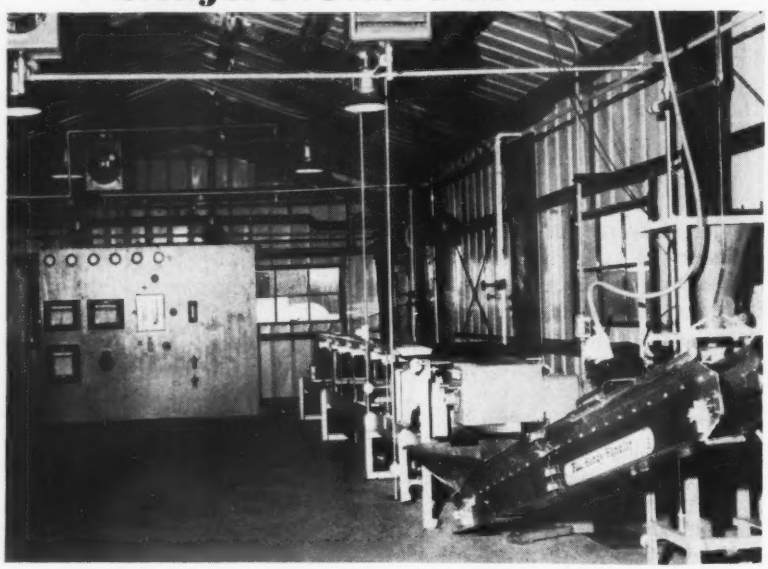
Kolker Develops Acaricide

A new chlorinated organic acaricide for mite control has been announced by Kolker Chemical Works, Inc.

P-chlorophenyl p-chlorobenzene sulphonate is to be marketed under the designation K-101 and for formulation in dusts or sprays. Compatibility with other insecticides and a long period of residual effectiveness are two features.

Industrial News

Stengel Process Pilot Plant



Leonard A. Stengel, Research and Development department, Commercial Solvents corporation, has developed a new patented process which makes custom sized particles of solid ammonium nitrate fertilizer.

The company is erecting a plant on a 2200-acre plot near Sterlington, La., where anhydrous ammonia and nitric acid already are being made.

Stengel, an authority on high pressure synthesis of ammonia and methanol produced from natural gas, holds other patents in this field. In 1926, he put into operation the first synthetic methanol plant in the United States.

A pilot plant has been in operation at Sterlington for the past year and has been the basis for designing a commercial unit. CSC's engineering department is handling the design and engineering requirements for the plant.

The Stengel process offers several advantages over conventional processes. Among these are lower capital investment, reduced operating expenses, and shorter time to build plants due to simplification of construction and process.

Deere Plans Entrance Into the Fertilizer Field

Deere and company is entering the fertilizer fiele.

The company has offered for sale 691,276 shares of $10 par value common stock at $32. Deere will use $20,780,000 from the sale of stock, and $50,000,000 from the sale of 25-year debentures to repay short term bank loans and to finance the $20,000,000 fertilizer and chemical plant to be built at Pryor, Okla.

Products of the plant will include ammonia, urea, and urea ammonia liquor. Raw materials will come from the Oklahoma oil fields.

Official saids that the plant may be in operation early in 1954 and will employ about 325 persons.

Lloyd E. Kennedy, vice president and treasurer, said, "there is a shortage of commercial nitrogen. We hope to improve the supply for fertilizer use.

Pesticide Production Increases

A 124 per cent increase over 1950 in production of pesticides and other organic agricultural chemicals recently was announced by the Tariff Commission. In 1951, 454 million tons were sold.

Cyclic pesticides and other cyclic chemicals accounted for 405 million pounds, of which benzene hexachloride represents 117 million pounds.

Industrial News

Advisory Committee Asks Allocation of Phosphorus

An allocation system of military requirements to producers of elementary phosphorus was asked by members of the elemental phosphorus Industry Advisory committee at a recent meeting with the National Production Authority. Allocations are to be made on the basis of production capacity.

According to the committee private industry now is producing enough elemental phosphorus to meet military munitions requirements and is ready to take over the share of production provided for defense by Tennessee Valley Authority.

A TVA representative said his agency has no objection to private industry's filling all military orders, because TVA's major operations are concerned with production of superphosphate for fertilizer.

Anticipated military needs for the fiscal year 1953 are 22,000 tons —approximately 5000 tons more than in 1952. Contracts already have been made for 7000 tons, according to a Defense Department spokesman.

Since July, 1951, when NPA made an agreement with TVA to supply elemental phosphorus for defense, TVA has provided one half of military requirements. This has taken up about 35 per cent of its production.

Smith-Douglass Company May Acquire Coronet Group

Smith-Douglass company, Inc. has made an agreement with stockholders of Coronet Phosphate company to acquire a majority of outstanding shares of the company.

Ralph B. Douglass, company president, said no change in Coronet's management or customer relations is planned if purchase is completed. Coronet employs more than 250 workers in its Lakeland, Fla. plant. The tract on which the plant is located includes several thousand acres of deposits. It supplies phosphate rock to fertilizer companies and defluorinated phosphate to manufacturers of poultry and animal feed.

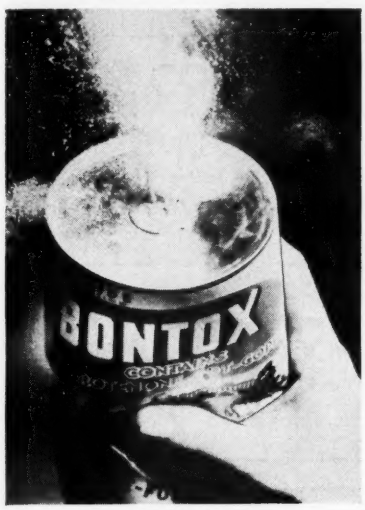
Nitrogen Division to Build New Oil Unloading Dock

Dravo corporation's contracting division has been awarded a contract for construction of a new oil unloading dock on the Ohio River at South Point, O., by Nitrogen division, Allied Chemical & Dye corporation. The structure will enable Nitrogen division to make greater use of river transportation facilities.

Four steel sheet pile cells, 16 feet in diameter, will be constructed for mooring barges. Unloading pipelines will be carried on a combined walkway and pivoted ramp from the top of the riverbank to a permanent mooring barge. The shore end of the ramp is anchored to a 13-foot diameter cell.

Industrial News

'Squeeze Can'



New Bonide Product

A new, more convenient container for packaging its products has been adopted by Bonide Chemical company of Utica, N. Y. Made by a special process, the container is convolutely constructed and sprayed with plastic gum, making it flexible and durable.

Primary advantage of the "squeeze can" is that it discharges its contents while held in any position. This enables the gardener to obtain an even distribution of dust on all portions of plants including the underside of leaves with a minimum of effort and waste. The "squeeze can" is so constructed that it can be completely emptied, thereby eliminating all waste caused by residue remaining in the package, according to the company.

Plaintiffs Lose Suit Over 1947 Texas Disaster

Plaintiffs suing the Federal Government for $350 million in damages from the Texas City fertilizer explosion in 1947 lost a decision in the Fifth Circuit Court of Appeals last month.

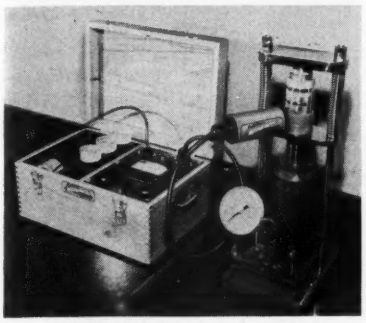
The decision reversed a district court ruling holding the government guilty of negligence in handling the ammonium nitrate shipments.

Judge Richard T. Rives said, "There is no evidence that . . . there was failure to use ordinary and reasonable care. The government was manufacturing not an inherently dangerous explosive such as dynamite, but fertilizer which was safe if dealt with normally. The evidence is that ammonium nitrate becomes explosive only when combined with other explosive compounds such as TNT. When not combined with substances such as these it constitutes only a fire hazard. In other words, it will burn but not explode."

The explosion killed an estimated 560 persons, as well as destroying the Monsanto Chemical company's $50 million styrene plant.

Industrial News

8-1 Moisture Tester



Model G5 Electronic Unit

Virtually any non-metallic dry granular material can now be tested for moisture content with Moisture Register company's new model G5 electronic tester.

Important features of the G5, according to the manufacturer, are its versatility and the speed and ease with which accurate readings can be made. The instrument consists of four separate units: master measuring unit, interchangeable range box, sampling unit consisting of electrode and sample cup, and hydraulic press with pressure gauge. The master measuring unit remains the same for all applications. The other three units can be interchanged when necessary to test a wide variety of materials or moisture ranges.

Construction of the entire unit is rugged. The master measuring unit, which closes for protection against dirt or damage, is contained in a sturdy oak box. The hydraulic press is equipped with chromed return springs and steel base ¾-in. thick.

For further data on the G5 Electronic Tester, fill out a **Reader Service** card, using number **8-1.**

. . . *Frit*

(Continued from page 20)

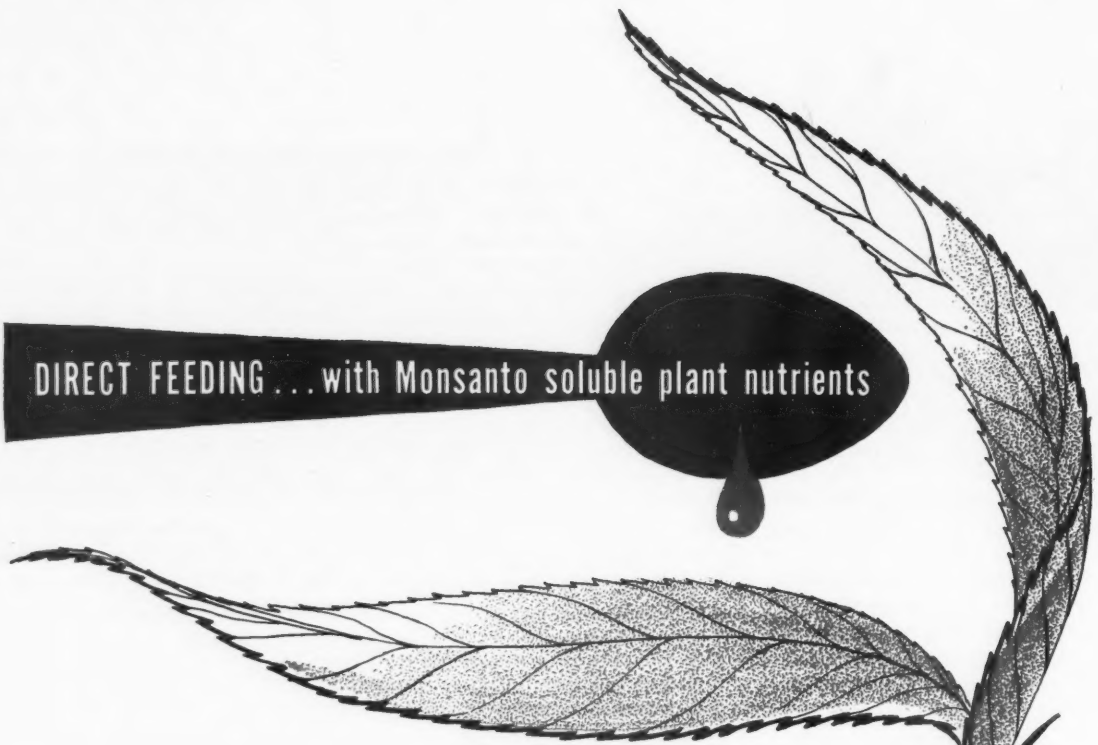
ing this possibility by using frit as the source of vital elements. It is thought that trace elements provide more nutrition in the foods we consume. This field also is being investigated by Ferro. Although results of disease resistance, frost resistance and nutritive experiments are not yet conclusive, data accumulated has been encouraging further investigation.

High analysis fertilizers are being used more and more in agricultural practices. The higher the concentration of the fertilizer the less probability there is it will contain traces of micronutrients unless they are supplemented. From this can be seen the need for further applications of trace elements in the form of frit because the frit will not react chemically with the high analysis materials.

Agricultural frit now is being commercialized by being offered to established fertilizer manufacturers for the purpose of mixing with the major element fertilizers. A trace element frit containing iron, manganese, boron, zinc, copper and molybdenum is the material being recommended for use. It is possible also to supply any one of the minor elements in a containing frit of its own.

The material soon should be available to home gardeners in small packages and sold as a separate item.

Research work which has extended over a five-year period is continuing at a fast pace. Frit is commercially acceptable at this time but there are many contingencies to be examined not only in regard to Ferro Agricultural Frit but also in the whole complex problem of trace elements. ◆



Soluble plant-nutrient chemicals by Monsanto are being formulated into fertilizer solutions, providing direct feeding to plants of nitrogen, phosphorus and potassium without harm to leaf crops. Immediate solubility, when applied directly to plants, is a characteristic of solutions of Di Ammonium Phosphate, Mono Ammonium Phosphate, Mono Potassium Phosphate and Phosphoric Acid 75%. They also are available for dry applications.

Shipped in appropriate containers, these chemicals are being used by fertilizer manufacturers in processing specific formulations for soil dressing or direct-to-plant applications. Standard farm equipment is used for either spray or solid application. For information concerning this available supply of plant-nutrient chemicals, contact any District Sales Office, or write MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700-A South Second Street, St. Louis 4, Mo.

☆ ☆ ☆ ☆

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto Canada Limited, Montreal.

MONSANTO PLANT NUTRIENT CHEMICALS			
	N	P_2O_5	K_2O
Mono Potassium Phosphate (Crystals)	—0—	51.6%	34.2%
Di Ammonium Phosphate (Crystals)	21.0%	53.85%	—0—
Mono Ammonium Phosphate (Crystals)	12.2%	61.61%	—0—
Phosphoric Acid (75.0%) (Liquid)	—0—	54.5%	—0—

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

Industrial News

V. P. at V-C

Alfred J. Dickinson

Alfred J. Dickinson Jr. is a new vice-president of Virginia-Carolina Chemical corporation.

Dickinson became associated with Virginia-Carolina in 1939 as assistant to the comptroller. Following World War II, in which he served with the FBI and U. S. Marine Corps, Air Combat Intelligence, he returned to the company's purchasing department. In 1947 he was named acting manager of that department and became manager in 1948.

Born in Eufaula, Ala., Dickinson is a graduate of the University of Richmond and Harvard University.

International Names Marshall Sales Head

Samuel P. Marshall Jr. has been appointed district sales manager of the Plant Food Division of International Minerals and Chemical corporation's Buffalo, N. Y. district.

Marshall joined International in January, 1950 as a territory salesman in the Tupelo, Miss., district. A graduate of Virginia Polytechnic Institute in agronomy, he has been engaged in field work by USDA and Agricultural Development Program under direction of Mississippi State College.

He succeeds L. A. Huntington, district sales manager since 1937.

8-2 *p*H Meter For Hydroponics

Hydroponics is one phase of agriculture in which *p*H plays an important part. This soilless growing of plants offers such a tremendous potential for labor-saving compared with conventional agricultural techniques that research is being constantly directed toward the study of plant growth mechanisms and problems.

Beckman Instruments, Inc. has two *p*H meters which are used extensively in the field of hydroponics. The model H-2 and the newer N-1 meters warn agriculturalists of rises or drops in acidity.

Users can make 100 separate *p*H measurements in an hour with the H-2 meter, according to the manufacturer. Fast warm-up time and battery operation are two advantages of the N-1.

To get more information on Beckman *p*H meters, fill out a **Reader Service** card, using number **8-2.**

8-3 New Chemical Waterproofs Spray

Frank Milligan, lumber and grain dealer in Jefferson, Ia., has developed a weatherized spray using DDT, rotenone and fermate. The adhesive, a latex derivative, holds chemicals on plants through heavy winds and rain.

The product, Plant Plate, is designed for use on gardens. It is marketed in both spray and dust form.

Milligan, an amateur gardener, became interested in weatherized sprays after rains washed conventional sprays from his roses on six consecutive nights. He sought the advice of 64 colleges having horticultural departments before finding a satisfactory elastic weatherproof substance that defies downpours without impeding normal plant growth.

For further information on Plant Plate, fill out a **Reader Service** card, using number **8-3.**

Promoted by Shell

D. F. Bradley

D. F. Bradley has been appointed manager of Shell Chemical corporation's Detroit sales office, succeeding W. E. Keegan, now assistant to the vice-president, in marketing.

Born in Detroit, Bradley joined Shell's Detroit office in 1947 as technical salesman. He then moved to New York as manager of the Solvents department.

A graduate of the University of Notre Dame, Bradley was associated with U. S. Rubber company and Bradley Concrete Products company before joining Shell. He was a fighter plane pilot in the Marines during World War II. His new duties include marketing of Shell's line of organic chemicals.

Simms Promoted

Robert C. Simms has been appointed a vice president and director of Thurston Chemical company.

Simms joined Thurston in 1951 as assistant to the president. For the preceding 24 years he had been associated with the Naco Fertilizer company of New York City. He resigned in February, 1951 as president, general manager and director to join Thurston.

Before entering the industry, Simms studied agriculture at the University of Illinois.

Industrial News

. . . Truitt Talk

(*Continued from page 28*)

(3) The fertilizer industry is well along with plans to produce enough products to meet the future need.

Surely, you may say this is a bright future, and all will be well as we go along. There are, however, other problems to be solved if the job of producing enough food is to be achieved by a more efficient agriculture. Let us take time to mention—but not fully discuss—just a few.

Seasonal Curve

The seasonal movement curve of fertilizer must, to some extent, be flattened out. Currently, too big a burden is put on production and distribution facilities during the planting season, and the demand is too slack in the off months. This problem may be attacked from several angles: improved manufacturing processes to permit longer storage periods; larger and better storage facilities, both on and off the farm; and the nation-wide pasture program permitting fall application, are some of the factors now being studied to bring added efficiency in fertilizer use.

The matter of farm income—the farmer's ability to buy—is of great, if not of the greatest, importance in getting farmers to buy what they need—not what they are willing to buy. And I emphasize, these concepts represent two very different amounts. Better means of financing the use of fertilizers may become very important.

The farm labor supply and the declining farm population also are reasons why, with all our other facilities to produce, we may not produce enough to meet all future needs.

And then, we have the weather, which now and then despite all our plans, takes its toll of crop output.

In short, our real job is to get all the increased fertilizer we are about to produce used on the land.

Too much of the sentiment still exists which—according to hearsay—once was expressed by a farmer to a salesman for a farm encyclopedia when he said: "Son, I ain't farmin' half as well as I know how now." From now on, we must farm as well as we know how now—and be alert to improve.

Having done all the things we have done to date, and being aware of some of the factors yet to be overcome, I suggest one course of action we all can support.

The education of the farmer is vital—on the value he gets from using the right amount of fertilizer. And, here, I use the word "value" in terms of dollars and cents. Farmers must be convinced.

For example, as stated, the chairman of the USDA's Fertilizer Policy committee only recently stated that "100 pounds of ammonium nitrate, or the equivalent in other materials, can be expected to increase the production of corn by 16 bushels." He added, of course, that it must be balanced with phosphate and potash and be used under the proper conditions.

But, here is the most important fact—important to the consumer as well as to the farmer—"The 16 bushels of corn will, in turn, produce enough meat for an average person for one year. Of course, similar results can be expected when nitrogen is used on other crops or on grasslands for the production of pasture or forage.

"We figure that, on a national average, two pounds of nitrogen, costing about 15 cents to 18 cents a pound, added to an acre of corn will increase production by one bushel."

$1 Yields $5

In other words, he says a dollar spent for nitrogen could mean $5 return.

The Secretary of Agriculture observes that the dependence of American agriculture on larger supplies of fertilizer comes as a surprise to most people—and even to most farmers.

The public, and farmers especially, should know, according to USDA, that five tons of nitrogen will produce 100 tons of corn. One hundred tons of corn will produce 20 tons of meat which will provide 150 pounds per person for 266 people each year.

USDA, also, reports that "40 pounds of nitrogen per acre, now applied only to tobacco, would give spectacular returns in field crops if used with adequate supplies of other fertilizer nutrients. It would produce an additional 600,000,000 bushels of corn—200,000,000 bush-

els of wheat—equivalent to present plantings of 14,000,000 acres in each crop—and 400,000,000 bushels of oats—equivalent to 11,000,000 acres. General use of 40 pounds of phosphoric acid an acre would boost soybean yields by 42 million bushels, the equivalent of almost 2,000,000 acres at current production rates.

"By doubling the current average application of phosphoric acid—8 pounds an acre—North Central growers could increase yields of corn by 120,000,000 bushels—and of wheat, by 30,000,000 bushels. This would be the equivalent of 3,000,000 acres of additional corn land, and more than 2,000,000 additional acres of wheat. Doubling the current average application of phosphoric acid—13 pounds an acre—on crops grown for hay would boost yields in the region by almost 3,500,000 tons, the equivalent of present production on more than 1,000,000 acres."

Grassland Program

Today, farmers everywhere are becoming increasingly concerned with grassland agriculture and, since no discussion of animal agriculture would be complete without some consideration of grassland farming, I now desire to take up that subject.

The potentials for improving our grassland farming in this country are tremendous. There are more than a billion acres of grasslands in the United States, most of which could be made more productive.

Grassland authorities tell us that most of the opportunities are in the humid area east of the Great Plains—that in the East, the South, and the Midwest there are millions and millions of acres of open grasslands that are not carrying their full load.

Dr. W. H. Myers, director of Field Crops Research at BPISAE at Beltsville, Maryland, says:

"Most of this land, especially that in pastures, is so low in productivity that the popular concept of grass as a poor crop is well justified. I think this land can be made to produce good grass crops that are profitable. Research has demonstrated conclusively that production can be doubled or tripled on most of this permanent grassland."

The USDA gives four principal reasons why grassland farming is so fundamental. They are:

(1) Grasslands are the source of major raw materials for producing milk and livestock products.

(2) Grasslands have great potential for further development, especially east of the 97th meridian. Here, there are 230 million or more acres of hay, plowable and nonplowable pastures and meadows subject to further improvement to provide greatly increased output.

(3) Improved grasslands will produce more total digestible nutrients than the feed grains per acre and at less cost and greater net return per man-hour of labor.

(4) Grasslands properly handled are valuable in restoring organic matter and humus to depleted crop lands. ◆

Connecticut Station Testing Conditioners

New soil conditioners such as Krilium will be tested exhaustively this summer by the Connecticut Agricultural Experiment Station to learn more about their mode of action.

In one Connecticut test, stem rot of geraniums developed in Krilium-treated soil. Check plants, grown under the same conditions, without Krilium, showed no sign of stem rot. The experiment now is being repeated in an attempt to learn if Krilium, directly or indirectly, produced deleterious effects. Proper usage also is being investigated.

Krilium is not the only conditioner being tested. At least five other brands are involved.

An announcement from the National Agricultural Chemicals Association said USDA and state agricultural colleges were joining in the research to determine which soil conditioners live up to the claims made for them by advertisers.

Connecticut also is trying such weed killers as 2, 4-D in combination with Krilium to see if the soil conditioner will counteract the soil-packing effect when the weed killer is used.

Simplot Adding Plant

Simplot Fertilizer company will build a plant at Pocatello, Idaho, designed to manufacture treble superphosphate fertilizer. New facilities should be in production by fall. Planned production is 45,000 tons annually.

How You Can Get

Free Information

On each of the two postage-paid postcards below you can request further information on four items described on this and the Industrial News section of this issue. *Fill out one quarter section for each item in which you are interested.*

8-4 EPN Manual

An article on the latest reports concerning duPont's EPN insecticide is included in this issue of FARM CHEMICALS. If you have read the article and would like more information, a Mixers Manual for EPN Dusts now is available. It provides the formulator with concise instructions for working with EPN 300 Insecticide Dust Concentrate, precautions to be taken, mixing instructions, recommended uses and labeling suggestions. **Code Number 8-4.**

8-5 Ferro Frit

An excellent means of "packaging" minor elements for easy application to the soil has been developed by the Ferro corporation, which manufactures an agricultural Frit containing trace elements. Information on the method used, formulation and availability is available, the company reports. **Code Number 8-5.**

8-6 Flexible Hose

There is a size and type of Chicago Flexible Metal Hose to meet every need. The manufacturer, Flexonics corporation, Chicago Metal Hose division, has descriptive literature on all six hose types. Numerous uses can be found for flexible metal hose, including moving connections, vibrating connections, misaligned connections and ones designed to absorb expansion. **Code Number 8-6.**

8-7 Trem Emulsifier

Your emulsion problem can be answered by Trem 618 emulsifier, a product of Griffin Chemical company. Trem 618 is designed for organic insecticide formulations in hard or soft water. It assures uniform dispersion and stability. A little Trem 618 goes a long way. The company has available full technical

Here is a list of the NEW PRODUCTS and BULLETINS described on this and the Industrial News pages of this issue giving their monthly code number.

- 8-1 Moisture Tester
- 8-2 pH Meter
- 8-3 Weatherized Spray
- 8-4 EPN Manual
- 8-5 Ferro Frit
- 8-6 Flexible Hose
- 8-7 Trem Emulsifier
- 8-8 Chemical Pumps
- 8-9 Stabilizer Baffle
- 8-10 Phosphate Tractor
- 8-11 Glass Pipe
- 8-12 Smirow Tankage
- 8-13 Fertilizer Conditioner
- 8-14 Monsanto Emulsifier
- 8-15 Safety Bulletin
- 8-16 'Duo-Lite' Bag

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data and a generous sample. **Code Number 8-7.**

8-8 Chemical Pumps

Here are chemical pumps engineered to your demands. Byron Jackson company makes a complete line of centrifugal pumps to answer all pumping needs. Literature lists the following advantages: quick and easy dismantling, interchangeable parts, corrosion-resistant catch basin, adjusting sleeve, grease lubrication and cored passages. These improved features were designed after BJ engineers asked users what features were wanted most. **Code Number 8-8.**

8-9 Stabilizer Baffle

Literature on International Engineering Stabilizer-Baffle now is available. The stabilizer baffle eliminates whipping of free-end suspended vertical mixer shafts, with no appreciable side thrust exerted on the shaft. It prevents shaft failures which would occur from critical speed conditions, the company claims. Thin shafts, up to 10 feet in length, can be used without the use of steady bearings or step bearings. The stabilizer-baffle consumes little space and need not rest on the bottom of the tank. **Code Number 8-9.**

8-10 Phosphate Tractor

To handle phosphate the way you like it, choose the proper size tractor for the job. To help you do this, the new Allis-Chalmers Tractor division has issued a new catalog describing all models. For handling wet phosphate both to and from storage, A-C torque converter tractors have proved to be the most economical tractors found to date, according to the company. A-C tractors move materials faster at lower cost. **Code Number 8-10.**

8-11 Glass Pipe

For corrosion resistance, it's Pyrex "Double-Tough" glass pipe. Corning Glass Works, the manufacturer, has literature available describing this easy-to-handle pipe. You can handle corrosive fluids with safety and economy. Breakage is no problem. It's easy to connect glass pipe to any other standard pipe material, valve or tank nozzle. Further information may be found in the pamphlet, "Pyrex brand Double-Tough Glass Pipe and Fittings." **Code Number 8-11.**

8-12 Smirow Tankage

Correct proportions of Smirow tankage in your fertilizers assure quality that makes a year-'round "growing season" for fertilizer manufacturers who use it. Smith-Rowland company tankage is a high quality source of nitrogen: 100 per cent organic, 90 per cent water insoluble and 90 per cent available. Smirow tankage always is in perfect mechancial condition and uniform in texture and color. **Code Number 8-12.**

8-13 Fertilizer Conditioner

A revolutionary conditioner which contributes maximum flowability to fertilizer, as well as eliminating extra plant fire hazards—these, says the Terra-Lite division of the Zonolite company, are some of the advantages of Terra-Lite brand vermiculite. Literature describing Terra-Lite vermiculite and Terra-Lite Conditioner, a mineral product designed for conditioning fertilizer, lists other advantages and uses. **Code Number 8-13.**

8-14 Monsanto Emulsifier

If your problem is forming a quick, stable and economical emulsion, the Monsanto Chemical company may have the answer. Literature describing Monsanto Emulsifier L says the emulsifier is highly efficient with DDT, 2,4-D esters, 2,4,5-T esters, Aldrin, Dieldrin, Lindane, Parathion and TEPP. It is a liquid blend of surface-active agents designed for use with insecticides and herbicides. **Code Number 8-14.**

8-15 Safety Bulletin

The Willson Products company has issued a new agricultural safety bulletin. The company manufactures a complete line of safety equipment for industry. Included are goggles and face shields, and respirators designed for safe handling of pesticide materials such as TEPP, HEPP, EPN, Parathion, Aldrin and Dieldrin. **Code Number 8-15.**

8-16 'Duo-Lite' Bag

You can find the answers to your bag problems with the Benjamin C. Betner company "Duo-Lite" bag. Available for pesticides and fertilizers in sizes from one to 25 pounds, Betner bags can be printed in four colors and can be made with combinations of materials. Samples and full technical information are available on these specially constructed bags. The bag is closed top and bottom with an inner-heat-sealed double fold. **Code Number 8-16.**

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Industrial News

. . . EPN

(Continued from page 16)

yellow striped armyworm. In addition to the dust formulation already mentioned, an emulsion spray has been tested in Mississippi.

Results of these tests showed that 100 per cent control was obtained with applications of both .1 and.2 pound of material per acre. Complete kill was achieved in 90 hours with the more dilute material and in only 22 hours with higher rate of application.

The beet webworm, a serious pest of sugar beets in the Great Plains and Rocky Mountain areas, is another major insect that has been successfully controlled through use of EPN. Experiments carried out in Colorado in 1951 showed EPN ranking among top materials for control of the webworm.

In one experiment the Colorado workers found that EPN gave 100 per cent control in three days. A second experiment showed a 98.4 per cent reduction of webworms after application.

In both experiments EPN, parathion, lindane, Metacide, chlordane; and toxaphene were very effective with no significant differences among them noted.

The accompanying chart provides an idea of the scope of research work carried out with the new pesticide, and from it an idea of the great potentialities of EPN can be gained.

Current recommendations make it one of the more versatile new organic pesticides and the promising results of numerous tests indicate it will have even greater application in the future.

Formulators interested in learning more about EPN can obtain a du Pont EPN dust mixers manual by using the **Reader Service** department in this issue. Fill out a card using code number **8-4.** ◆

LATEST RECOMMENDATIONS FOR EPN

CROPS	CONTROL			
	OUTSTANDING	COMMERCIAL	PROMISING (EXPERIMENTAL)	MEDIOCRE OR INEFFECTIVE
POME FRUITS[1]	European red mite Pear psylla Plum curculio	Apple flea weevil Codling moth Pacific mite Red banded leaf roller Schoene mite Two-spotted mite Willamette mite Red spider mite Fruit tree leaf roller	Apple leafhopper Apple maggot Forbes scale Grasshoppers Japanese beetle adults Oriental fruit moth (quince) Quince curculio Round-headed apple tree borer San Jose scale crawlers Spotted tentiform leafminer	Bryobia mites Eye spotted bud moth Green apple aphid Oystershell scale Scurfy scale crawlers Wooly apple aphid
STONE FRUITS	Plum curculio Oriental fruit moth European red mite	Olive scale crawlers Two-spotted mite Red banded leafroller (first brood) Pacific mite Red spider Willamette mite Schoene mite Peachtree borer Lesser peachtree borer Lecanium scale (crawlers) Peach cottony scale (crawlers) Olive scale crawlers Fruit tree leaf rollers Budmoth	Apple pandemis Green leaf roller Mealy plum aphid	Bryobia mites Cat-facing insects Green peach aphid

CROPS	CONTROL			
	OUTSTANDING	COMMERCIAL	PROMISING (EXPERIMENTAL)	MEDIOCRE OR INEFFECTIVE
CITRUS		Orangeworms Citrus thrips Fruit tree leaf roller Orange tortrix Citrus red mite	Citricola scale Citrus bud mite Citrus rust mite Mealybug Scavenger worm Lewis mite	Black scale California red scale Green citrus aphid Purple scale Yellow scale
COTTON	Yellow-striped armyworm	Atlantic mite Pacific mite Red spider mite	Two-spotted mite Pink bollworm Septanychus texasona Boll weevil	
VEGETABLES		Beet webworm (sugar beets) Mexican bean beetle Onion thrips Potato aphid European corn borer Russet mite Two-spotted mite	Flea beetles Serpentine leafminer Squash vine borer Tuber flea beetle Western spotted cucumber beetle Wireworm "Whitefly"	Cabbage maggot Corn earworm Potato aphid Squash bug Turnip aphid
TOBACCO			Hornworms Tobacco budworms	Green peach aphid
WALNUTS	European red mite	Two-spotted mite Pacific mite Red spider Willamette mite Schoene mite Codling moth Walnut aphid Fruit tree leaf roller	Walnut husk fly Frosted scale Black walnut aphid	
PECANS	European red mite	Two-spotted mite Pacific mite Red spider mite Willamette mite Schoene mite Pecan nut casebearer	Hickory shuckworm Pecan weevil	
ALMONDS	European red mite	Two-spotted mite Pacific mite Red spider mite Willamette mite Schoene mite		
GRAPES	European red mite	Two-spotted mite Pacific mite Red spider mite Willamette mite Schoene mite Grapeberry moth		

[1]Not recommended for use on apples of the Fameuse-McIntosh group.

Inconclusive tests have been conducted with EPN for following cotton insects: cotton bollworm, cotton aphid, cotton leafworm and salt marsh caterpillar; and for these vegetable pests: cabbage worms, Colorado potato beetle, 12-spotted cucumber beetle, potato leafhopper and tomato hornworm.

Industrial News

Corn earworm, bean beetle increase . . .

United States Pest Survey

State pest surveys taken during June and early July indicate an increase in the infestations of several major crop pests. The corn earworm, Mexican bean beetle, black cutworm and beet webworm are included among the pests currently responsible for moderate to heavy crop damage.

Use of insecticides seems to be holding others in check and poison baits, sprays or dusts have been used against grasshoppers, boll-weevils, beet webworm and several other crop pests.

As a whole, infestations of the **European corn borer** continue to be light, although several areas report serious numbers. In southwest Minn., some field counts through June 28 ran over 100 masses per 100 stalks. Situation there is considered especially dangerous because the corn height (averaging 28 inches) is sufficient to permit high survival of newly hatched larvae.

In southeast S. D. egg masses averaged 30–35 per 100 plants on corn averaging 40–45 inches high; infestations run about 25–30 masses in the central east counties and 10–20 in northeast.

Other state reports include: Md. —borers of all stages present in central section, second generation expected to be heavy; N. J.—egg masses up to 175 per 100 plants found, situation considered critical; Del.—severe injury from Dover southward; Tenn.—moderately abundant in early planted fields; Ill.—only exceptionally tall corn showed even moderate infestations.

Grasshoppers—Bait mixing stations have been operating in three Wis. counties where there has been insufficient rainfall. Spraying and baiting has been carried out in Tehama county, Cal., where the infestation is reported the highest since 1949.

Control measures have been carried out in several other Cal. districts where large numbers of the pest developed. Strip spraying with chlordane has been used to protect cultivated crops from the valley grasshopper; sprays and dusts of chlordane at three pounds actual material per acre was used on dry range land in Merced county where the devastating grasshopper is present in greater numbers than any period since 1949.

Toxaphene baits have been spread on several thousand acres in Kern county where potatoes and cotton were threatened. Destruction of several acres of beans in Monterey county was reported and in Glenn county nearly 10,000 acres have been treated with toxaphene-DDT sprays.

Sugarcane borer—Very heavy infestation in many sections of La. with indications there will be a destructive second generation over much of the sugar cane acreage.

Corn earworm—N. J. reports indicate this pest has become a major threat and considerable damage has been noted in Del. Severe injury to early sweet corn occurred in Ohio, unusually heavy numbers in Ill. and abundant eggs and larvae on early market corn in Utah have also been found.

Two other pests of forage crops were mentioned in recent state reports. The **alfalfa weevil** previously reported as a threat in N. J. has been found generally distributed through three counties in that state.

Adult spittlebug damage to second cutting alfalfa was discovered in a Md. field. The alfalfa had been sprayed but not nearby clover and the resulting infestation resulted in severe stunting and loss of quality. Although new growth was present in the infested area, plants were a full 10 inches shorter than those in surrounding fields.

At the end of June, dusting operations in Ala. for **Boll Weevil** control were underway in only a few fields and the average infestation was 29.7 per cent. An increase was noted in the percentage of punctured squares in Ga. fields and, in both poisoned and unpoisoned fields the infestation was considerably higher than last year.

Increased use of poisons and high temperatures have helped to hold steady the infestations in S. C. Use of pesticides in Tex. cotton fields has reduced the overall weevil populations although scattered fields were reported still to be in need of immediate insecticide applications.

Okla. infestation was reported spotty, and the numbers of weevils in Ark. are declining. Serious damage occurred late in June in the Rio Grande Valley, Tex.

Bollworms—Most reports on the bollworm indicate that damage and numbers of the insect have been light to moderate. Reports include: Ala.—2 per cent infestation in Chilton county only; Ga.—slight decrease although considerable damage occurring in some areas; S. C.—light infestations in most N. W. districts; Tex.—no serious outbreaks, injurious in some isolated fields; La.—large numbers previously reported now declining; Miss.—heavy in most areas.

Fleahoppers—Although most sections report cotton fleahoppers in light numbers only, migration into fields in damaging numbers has been reported from southern Tex. Other state reports: Ala.—light damage found in some fields; N. M. —none heavy enough to warrant control measures; Okla.—increasing in one county, control might prove necessary.

Presence of other cotton pests including aphids, thrips and red spider has been reported from several areas, but only in small numbers.

Mexican bean beetle—Re-

Buyers' Guide

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AGRICULTURAL CONSULTANTS
Bailey & Lerch, Washington, D. C.

ALDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

AMMONIA—Anhydrous and Liquor
Commercial Solvents Corp., New York City
Lion Oil Co., El Dorado, Ark.
Mathieson Chem. Corp., Baltimore, Md.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM PHOSPHATE
Monsanto Chem. Co., St. Louis, Mo.

AMMONIUM SULFATE
See Sulfate of Ammonia

BAGS—Burlap
Bemis Bros. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.
Virginia-Carolina Chemical Corp., Richmond, Va.

BAGS—Multiwall-Paper
Bemis Bro. Bag Co., St. Louis, Mo.
International Paper Co., Bagpak Div., N. Y. C.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Jaite Company, The, Jaite, Ohio
Kraft Bag Corporation, New York City
Mente & Co., Inc., New Orleans, La.
Raymond Bag Co., Middletown, Ohio
Union Bag & Paper Corp., New York City
Virginia-Carolina Chemical Corp., Richmond, Va.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

BAG CLOSING MACHINES
Fischbein Co., Dave, Minneapolis, Minn.
International Paper Co., Bagpak Div., N. Y. C.

BAG CLOSING—THREAD & TWINE
Bemis Bros. Bag Co., St. Louis, Mo.
Mente & Co., Inc., New Orleans, La.

BAG PRINTING MACHINES
Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

BHC AND LINDANE
Ashcraft-Wilkinson Co., Atlanta, Ga..
Commercial Solvents Corp., New York City
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

BONE PRODUCTS
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
McIver & Son, Alex M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID
American Potash and Chem. Corp., N. Y. C.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—Hoist, Crane, etc.
Hayward Company, The, New York City

CALCIUM ARSENATE
American Agricultural Chemical Co., N. Y. C.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

CARS AND CART
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CHLORDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

CLAY
Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

CONTROL SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

CONVEYORS—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

COPPER SULFATE
Andrews Sales, Inc., W. R. E., Philadelphia, Pa.
Phelps Dodge Refining Corp., New York City
Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa

DDT
Ashcraft-Wilkinson Co., Atlanta, Ga.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

DIELDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.

DILAN
Commercial Solvents Corp., New York City

DILUENTS
Ashcraft-Wilkinson Co., Atlanta, Ga.

DITHIOCARBAMATES
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

DRYERS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS—Bucket
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City
Fairlie, Inc., Andrew M., New York City
General Industrial Development Corp., N. Y. C.
Marietta Concrete Corporation, Marietta, Ohio
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation, Nicolay, New York City

FERTILIZER—Mixed
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Virginia-Carolina Chemical Corp., Richmond, Va.

FILLERS
McIver & Son, Alex. M., Charleston, S. C.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston. S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH
Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES
American Agricultural Chemical Co., N. Y. C.
Andrews Sales, Inc., W. R. E., Philadelphia, Pa.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Tennessee Corp., Atlanta, Ga.

HERBICIDES
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.

HERBICIDES—Oils
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Lion Oil Company, El Dorado, Ark.

HOPPERS & SPOUTS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Carnegie Chemical Mfg. Co., Los Angeles, Cal.
Southern States Phosphate & Fertilizer Co., Savannah, Ga.
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES
American Agricultural Chemical Co., N. Y. C.
Andrews Sales, Inc., W. R. E., Philadelphia, Pa.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corp., New York City
Milligan Bros., Jefferson, Iowa
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Powell & Co., John, New York City
Virginia-Carolina Chemical Corp., Richmond, Va.

IRON SULFATE
Tennessee Corp., Atlanta, Ga.

LEAD ARSENATE
American Agricultural Chemical Co., N. Y. C.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

LIMESTONE
American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
McIver & Son, Alex. M., Charleston, S. C.
National Lime & Stone Co., Findlay, Ohio

LOADERS—Car and Wagon
Sackett & Sons Co., The A. J., Baltimore, Md.

ported as very abundant on beans in many areas of Del. and increasing throughout the state. Present in N. Y. and Colo. and decreasing in the area around Clarksville, Tenn., probably because of the use of insecticides. Heavy infestations on garden plantings in S. C. but the commercial harvest has been completed.

The **Colorado potato beetle** has been present in abundant numbers in several states including S. C., Tenn., Colo., Ida. and Ore. Found on both early potato and tomato in Colo. and on eggplant in Berkeley county, S. C.

Black cutworms have been very active on corn in N. Y. and Cal. and on pepper in Del. Various cutworms have been destructive to corn in N. J. and variegated cutworms were found in some areas of Del.

Increase in the number of **pea aphids** in N. Y., Wis., Ida., Utah and Wash. has been reported. Light infestations have been found in alfalfa growing in the desert area of San Bernardino county, Cal.

The **beet webworm** in Colo. has been developing rapidly on sugar beets. Light traps at two stations averaged better than 750 moths per night during early June. Airplane sprays have been applied.

Three states, Del., Ohio, Wis., reported severe infestations of the **potato leafhopper** and damage has been noted in N. Y. and Md. It has damaged alfalfa in Md. and has attacked all varieties of beans except limas in one Ohio county.

Codling moth infestations have been reported as light in most areas. Little first brood activity expected in N. J., spring brood moth emergence complete in Wash.; medium infestations in apple and pear in Lassen county and in walnut in Riverside county, Cal. Number of entrances indicate severe infestation in Ohio if high temperatures continue.

Peak of second brood emergence in two Ind. counties expected late in July, and checks taken in southern Ill. showed no fresh entries of second brood. In Ill. stragglers in unsprayed blocks showed a slight increase in total infestation.

European red mite—Good control reported from N. Y. and N. J. Mites increasing in some southern Ill. apple orchards and is common in the Yakima valley of Wash.

Heavy infestations of **tobacco budworms** have been reported from Tifton district, Ga. All stalks seem to be infested and one agent has reported as many as 15 larvae per leaf. Plentiful, especially on burley tobacco in Tenn. and present in normal numbers in northwest Fla.

Sulfate of Ammonia Increases in Mexico

Production and consumption of sulfate of ammonia in Mexico in the last two years increased by 500 per cent according to a report issued by Nacional Financiera, semi-official government finance agency. The report revealed that one year after inauguration of a new plant in Cuautitlán, Mexican agriculture is feeling the benefits in improved yields and better quality crops.

The plant, built at a cost of $10,414,800, has produced more than 100,000 tons of the chemical in the period from June 1951 to June, 1952. This compares with a production of 28,000 tons in the 1950 period and 24,000 tons in 1949.

"Guanos and Fertilizantes," still the only sulfate of ammonia plant operating in Latin America, sells its product direct to farmers and farm credit banks. A further increase of production by 10,000 tons a year will be needed to meet demand, it was reported.

Main purpose of the Mexican Government in sponsoring national production was to lower prices for the product which, imported, sold at $110.46 a ton. Large scale national production has reduced this figure to $52.32 a ton. The Government is interested in still further reductions.

Beneficial results of widespread use of fertilizer already are coming in, although reports still are scattered. Wheat farmers who previously harvested a crop of 1600 pounds of wheat from 2½ acres now have raised production to three tons. This same tripling of former production has been observed in cane, corn and other crops, apart from "magnificent results" obtained in fertilizing and cultivation of fruit trees and vegetables.

One German farmer in Mexico who had been using fertilizers to produce "bumper crops" told the Mexican fertilizer producing firm his neighbors did not like the fact that he raised such abundance on a limited area of land. Mexican farmers, with limited or no knowledge of fertilizers, must now be educated.

Nacional Financiera has prepared bulletins and leaflets giving instructions in the use of fertilizers and fertilizer experts of the finance agency as well as the manufacturing firm are traveling throughout the Republic, instructing rural farmers how to utilize fully their acreage through fertilizers.

DuPont Celebrates 150th Anniversary With Pageant

Celebration of the 150th anniversary of the founding of E. I. DuPont de Nemours & Company, July 15, included a pageant and a speech by the company's president, Crawford H. Greenewalt.

More than 7,000 people, including 700 representatives from duPont's 71 plants, saw Edward Franz and Sigrid Gurie depict the founding of the company 150 years ago along the Brandywine River.

Greenewalt, in addressing the group, pointed out that "our progress up to now has been in direct ratio to the degree of human freedom afforded us." He said he is of the opinion that, on the plea of crisis or emergency, we are losing piecemeal our freedom.

Henry B. duPont, company vice-president, outlined the company's development. A seven-ton monument, made of one of the two original millstones was unveiled by Walter S. Carpenter Jr., board chairman.

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MACHINERY—Acid Making and Handling
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Acidulating
Chemical Construction Corp., New York City
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Ammoniating
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Material Handling
Atlanta Utility Works, The, East Point, Ga.
Hayward Company, The, New York City
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Mixing, Screening and Bagging
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Power Transmission
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY
Superphosphate Manufacturing
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

MANGANESE SULFATE
McIver & Son, Alex. M., Charleston, S. C.
Tennessee Corp., Atlanta, Ga.

MANURE SALTS
Potash Co. of America, New York City

MINOR ELEMENTS
Andrews Sales, Inc., W. R. E., Philadelphia, Pa.
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Carnegie Chemical Mfg. Co., Los Angeles, Cal.
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGEN MATERIALS—Organic
American Agriculture Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PARATHION
Ashcraft-Wilkinson Co., Atlanta, Ga.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

PENTACHLOROPHENOL
Monsanto Chemical Co., St. Louis, Mo.

PHOSPHATE ROCK
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID
American Agricultural Chemical Co., N. Y. C.
Gen. Chem. Div., Allied Chem. & Dye., N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

PLANT CONSTRUCTION—Fertilizer and Acid
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
General Industrial Development Corp., N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation Nicolay, New York City

POTASH—Muriate
American Potash & Chemical Corp., N. Y. C.
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, New York City
Southwest Potash Corp., New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate
American Potash & Chemical Corp., N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Potash Co. of America, Washington, D. C.

POTASSIUM PHOSPHATE
Monsanto Chemical Co., St. Louis, Mo.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SACKING UNITS
Sackett & Sons Co., The A. J., Baltimore, Md.

SCALES—Including Automatic Baggers
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS
Atlanta Utility Works, The, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman Foundry and Machine Co., Aurora, Ind.

SEPARATORS—Air
Sackett & Sons Co., The A. J., Baltimore, Md.

SOIL TESTING APPARATUS
La Motte Chemical Products Co., Baltimore, Md.

SPRAYS
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

STORAGE BUILDINGS
Marietta Concrete Corporation, Marietta, Ohio

SULFATE OF AMMONIA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Inland Steel Co., Chicago, Ill.
Jackle, Frank R., New York City
Koppers Co., Inc., Tar Products Div. Pittsburgh, Pa.
Lion Oil Co., El Dorado, Ark.
McIver & Son, Alex. M., Charleston, S. C.
Phillips Chemical Co., Bartlesvi'le, Okla.
United States Steel Corp., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Texas Gulf Sulphur Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
McIver & Son, Alex. M., Charleston, S. C.
Southern States Phosphate Fertilizer Co., Savannah, Ga.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.

SUPERPHOSPHATE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Davison Chemical Corporation, Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Southern States Phosphate Fertilizer Co., Savannah, Ga.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Virginia-Carolina Chemical Corp., Richmond, Va.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
McIver & Son, Alex. M., Charleston, S. C.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TEPP
Monsanto Chemical Co., St. Louis, Mo.
Virginia-Carolina Chemical Corp., Richmond, Va.

TOXAPHENE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.

2, 4-D
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

2, 4, 5-T
Gen. Chem. Div., Allied Chem. & Dye, N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

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Alphabetical List of Advertisers

Chemicals on foods—

Delaney Seeks More Legislation

"EXISTING Federal laws do not provide complete protection to the public against the addition of chemicals which may be unsafe."

That is the most important statement in the concluding report of the Delaney committee, which covers chemical additives in and on foods.

In its final report to Congress, the Select Committee to Investigate the Use of Chemicals in Foods and Cosmetics recommends further regulation before new farm chemicals are admitted for general use.

In the words of the committee, "It is essential that, before a pesticide is permitted to be used on a food, reliable methods of analysis for the quantitative determination of the chemical be available."

No Specifications

The group recommends that legislation to cope with the chemicals in food problem should not attempt to specify the type and manner of pretesting which should be conducted.

"Rather," the report urged, "the legislation should provide that evidence that the chemical is safe, and does not produce harmful chemical reactions, in the end food product, should be submitted to the Food and Drug Administration for clearance before the chemical is utilized. In any evaluation of the safety of any proposed chemical, the extent of the use of the chemical, or similar chemicals, in or on other foods, must be taken into consideration."

The Delaney committee stated it recognized the need for "supplemental legislation" which will provide "more adequate protection to the public."

On the other hand, the committee said it also recognizes the necessity for the continued use of chemicals in sprays and other insecticides if the nation is to be supplied with food.

Other reports of the Delaney group covered fertilizers, cosmetics and the fluoridation of water. They were based on public hearings held in 1950 and 1951.

Minority Report

The report was signed by Chairman Delaney and four other members of the select committee. A separate minority report was filed by Rep. Walt Horan (R-Wash.) and subsequently concurred in by Rep. Thomas G. Abernethy, (D-Miss.).

The basis of the minority views was that "adequate legal processes are already in existence for the full protection of the consuming public."

The report termed the majority opinion "reactionary and a deterrent to progress." In order to insure enough food for increased population, the report said "we must employ every safe advantage or benefit to be gained by science in the conservation and maintenance of our fertile acres."

A UNITED CONGRESS

To those who assemble this month at State College, Pennsylvania, for the Sixth International Grassland Congress, P.C.A. extends congratulations and thanks for the great work already accomplished.

We are confident that the current session will make further valuable contributions to the advance of soil science.

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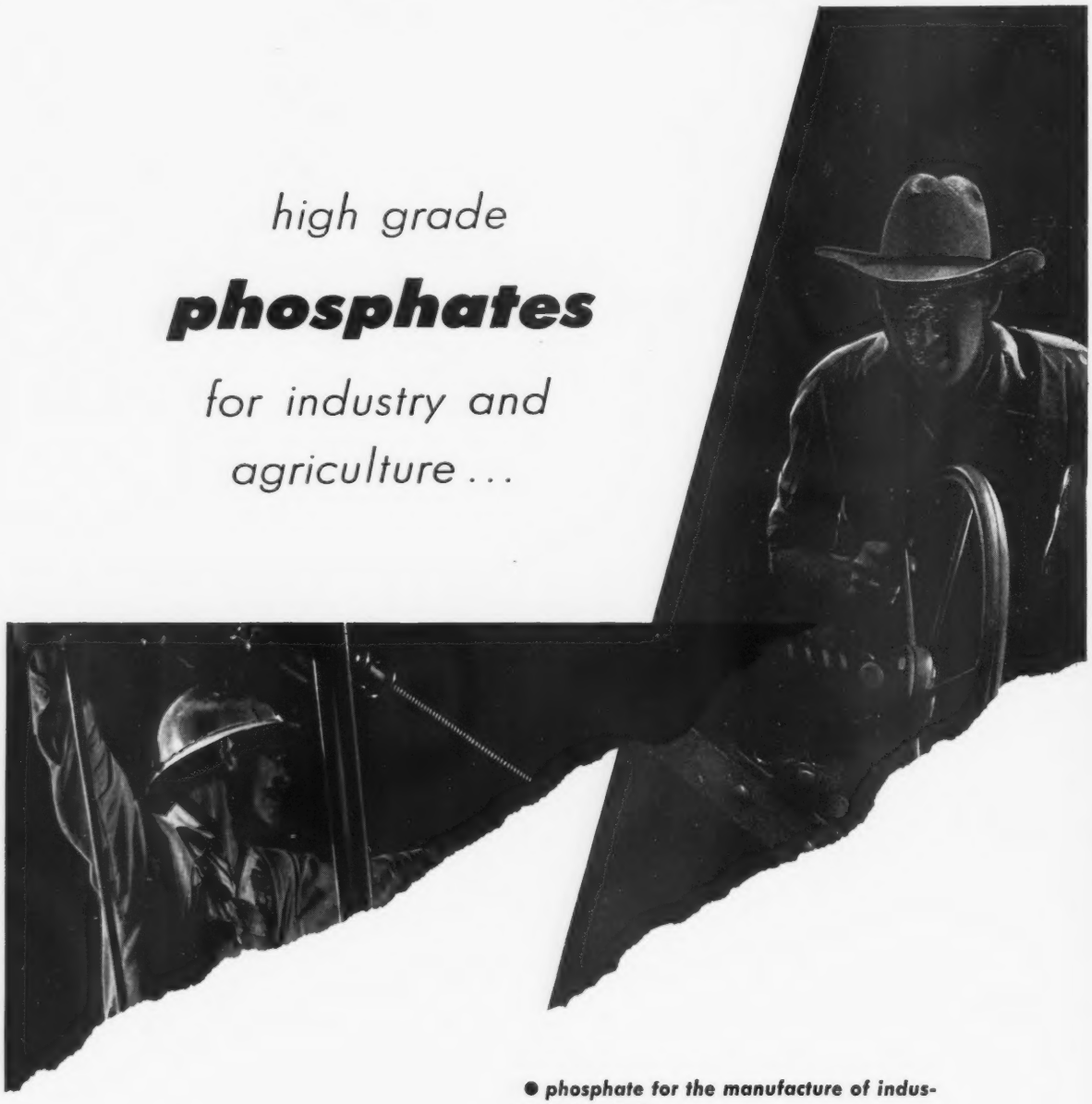

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